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A CHILTON PUBLICATION

The Iron Age

THE NATIONAL METALWORKING WEEKLY

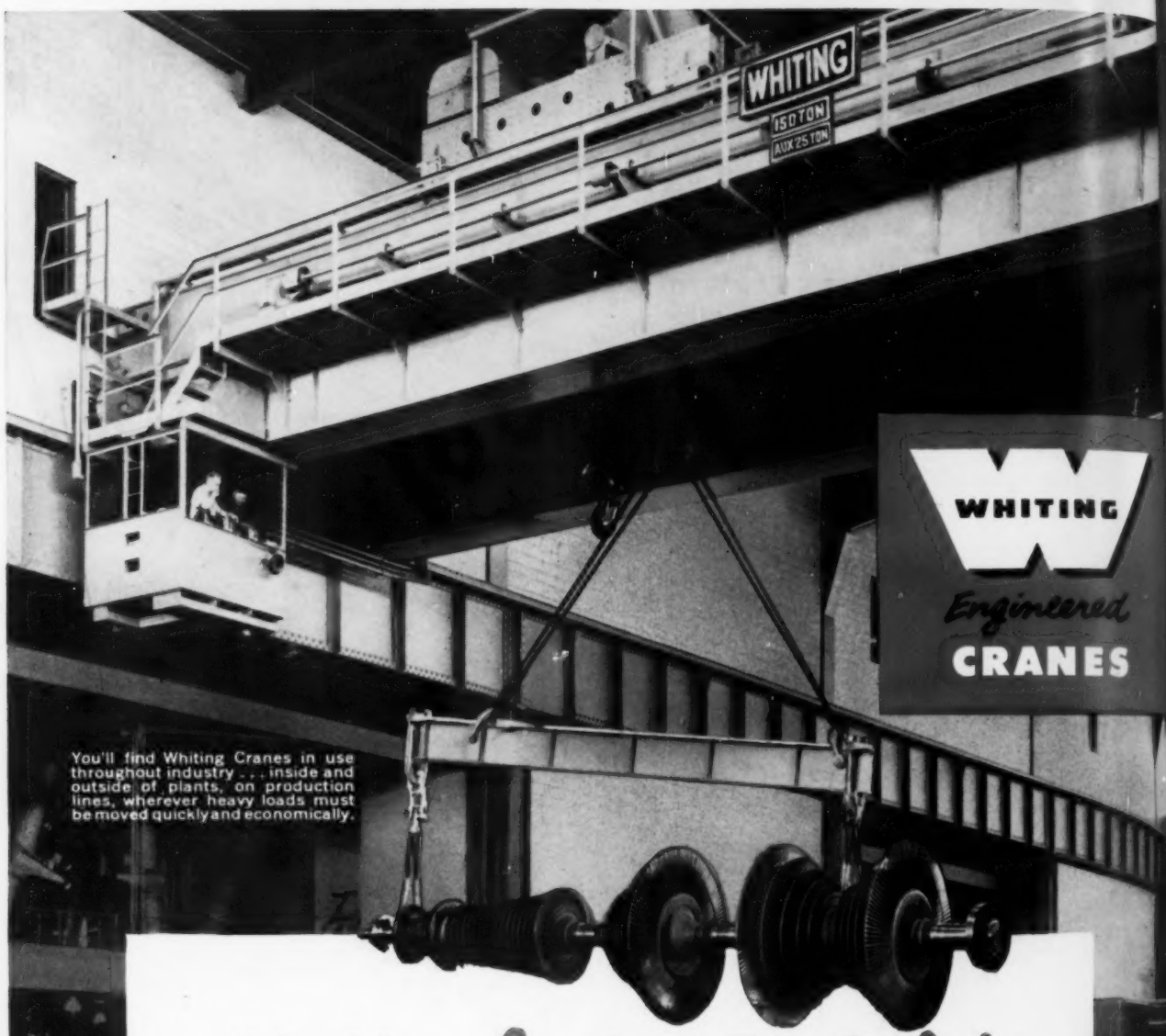
April 10, 1952

CONTENTS PAGE 2

STEEL MINE

If American industry will "mine" its dormant scrap—the obsolete and worn-out machinery and equipment hidden, overlooked and forgotten in its plants and yards—present record-high steel production can continue.

INLAND STEEL COMPANY
38 South Dearborn Street
Chicago 3, Illinois



WHITING
Engineered
CRANES

You'll find Whiting Cranes in use throughout industry . . . inside and outside of plants, on production lines, wherever heavy loads must be moved quickly and economically.

Big Muscles for Big Jobs!

Lifting heavy loads for powerhouses, foundries and warehouses... *carrying* locomotives, steel girders and machinery. Whiting Overhead Cranes do these big jobs better for they are engineered to-the-job and thus provide *longer* life, *greater* safety, and *lower* operating and maintenance costs.

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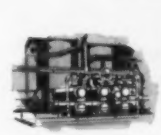
Swenson Equipment for the Chemical Process Industries


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THESE WHITING PRODUCTS
ARE INCREASING THE NATION'S
PRODUCTIVE STRENGTH


Electric Furnaces and Other Foundry Equipment

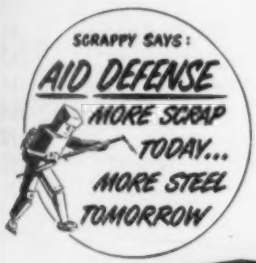

Trambeam Overhead Handling Systems


Electric Chain Hoists

Even today you may see here and there a steel plant with a big scrap pile. "Look at all that scrap!" you say. "Why the talk about a scrap shortage?"

Just a minute! The chances are, that big pile is only a few days' supply. For it takes on the average a half ton of scrap to make a ton of steel. To keep the steel mills of the country operating at capacity calls for *95,000 tons of purchased scrap every day.*

That's why it's so urgent to move the millions of tons of forgotten scrap that's snagged up in plants and factories and on farms all over the country. Freeing that dormant scrap to build up the steel mills' scrap piles would mean a far brighter steel supply picture, with more steel for everybody. So make a systematic check of your plant for dormant scrap, and then call in a scrap dealer!



BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

More Scrap Today... More Steel Tomorrow

IRON AGE

APRIL 10, 1952
VOL. 169, No. 15

THE IRON AGE
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National Business Publications

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CONTENTS

★ Starred items are digested on opposite page.

DIGEST

of the week in metalworking

PAGE 73

JAMAICAN BAUXITE TO COME TO U. S. SOON

The Iron Age presents the picture-prose saga of Reynolds Metals Co.'s development of Jamaica's rich bauxite mines. Editor Tom Campbell tells the human interest details of the aluminum ore discovery, its importance to American defense and its "human engineering" impact on agrarian Jamaica.

PAGE 77

CRUCIAL WEEK FOR STRIKE NEGOTIATIONS

Steel industry-union bargaining continued up to the strike deadline. But there was little chance that a settlement would be reached in time. One faint hope was kept alive—if agreement was not reached this week it could be attained shortly afterwards to halt a strike in a week or two.

PAGE 78

GUNNISON TO MAKE STEEL PRE-FAB UNITS

U. S. Steel's Gunnison Homes, Inc., will build all-steel military shelters. This may foretell the firm's entry into the steel pre-fab housing field. Until now Gunnison has been working in wood. Initial output will be aimed at the military but Gunnison may later make the civilian steel pre-fab.

PAGE 80

HIGH COSTS, TAXES DROP STEEL PROFITS

A triple-pronged attack of high taxes, higher costs, and price controls combined to send steel industry net profits into a nosedive for 1951. A survey by The Iron Age shows that only nine of 27 producers could list higher earnings. Net income for the whole group decreased by 13.2 pct.

PAGE 91

'CLEAR UP OR CANCEL DISTRESS CONTRACTS

Either define clearly the terms under which distress area defense contracts may be awarded or cancel the whole muddled idea, indicated the Navy. It has flatly said it will award no distress contracts unless it gets clean-cut rules. Congress' assurance for "high" price contracts is needed.

PAGE 96

SPRING WISH TO HIT ROAD SPURS CAR SALES

Car customers are feeling spring twinges of desire to hit the road. This is spurring movement to the salesrooms to see new models and it seems that demand is now outstripping output. It's due principally to cutbacks. Industry is still wary of raising prices that may dampen buying ardor.

PAGE 103

MACHINE TOOL GROUP STALLED, NOT KILLED

Resignation of Defense Mobilizer Wilson, who planned to strengthen the machine tool industry in peace, does not mean that plans to form a tool commission are dead. They may be carried on by Clay Bedford, Special Assistant to the Secretary of Defense. Holdback so far has been steel trouble.

PAGE 113

USE OF VAPOR DEPOSITION IS INCREASING

Vapor deposition is enjoying a revival. Dense, uniform coatings of metals and non-metals can be deposited on one-another at temperatures well below melting points. The process can be continuous. Wire, rod, tubing, strip, and various shapes have been coated at atmospheric pressures.

PAGE 118

CONTINUOUSLY-CAST AL ROLLED INTO STRIP

Continuously-cast aluminum bar, cut to 55-ft lengths, is hot rolled into strip for venetian blinds without scalping or edge trimming. Casting speeds are as high as 15 fpm. Bar is 7 in. wide, but can be cast much wider. Two induction furnaces melt as much as 6000 lb of metal per hr.

PAGE 124

HYDROFORMING VALUABLE IN SMALL SHOP

Press forming with the new Hydroform machine has many advantages particularly important to the small shop. It is economical for development work and other jobs with short runs and frequent materials changes. Tool cost is low. Tooling time is low. Often the number of operations is cut.

PAGE 159

STEEL INVENTORIES WAY OUT OF BALANCE

Although the government had been controlling steel distribution for many months, consumers faced the strike deadline with inventories far out of balance. A good many consumers had fairly good-sized inventories. But some critical items were so short they would soon choke production.

NEXT WEEK

DETAILED REPORT ON MACHINING TITANIUM

Detailed report based on Navy-Westinghouse research tells how to machine titanium; tool design, speeds, feeds, and coolants. Covers turning, broaching, drilling, tapping, reaming, and milling. Includes first published data on production use of liquid carbon dioxide as coolant.

100% Alloy recovery

WITH AJAX-NORTHRUP INDUCTION HEAT

Ajax-Northrup furnaces are famous for their ability to give back what you put into them. They melt any metal with minimum losses, at high speeds, and with extremely accurate control of analysis and pouring temperatures.

For example, a foundry using these furnaces to melt stainless steel for corrosion and heat resistant castings reports the following figures on recovery of elements going into the make-up of 18-8 type alloys:

Ni: 100% Cr: 99% Mn: 90%
Si: 94% Mo: 95% Cb: 92%

Another Ajax user saves $60,000 a year just by reducing chromium losses alone. Still another controls pouring temperatures within 20 deg. F., turns out castings so perfect that repair welding has been eliminated.

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SEND FOR NEW INDUCTION HEATING AND MELTING BULLETIN

134

FOR HEATING AND MELTING

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AJAX PARK
TRENTON 5, NEW JERSEY

The Iron Age
FOUNDED 1855

Confiscation!

AS things stood early this week we were on the verge of seeing our government indulging in gangster methods. We could go farther. If the steel industry is taken over there will be little difference between our government and a dictatorship.

There is no law on the books that can be stretched enough to give the President authority to seize the steel industry. Neither health nor safety is involved. The amount of steel orders that are being filled for defense is a small part of total steel being made.

Mr. Truman, in double-crossing Charles E. Wilson, went to lengths unknown in our history to side with his labor friends. Were a President to do half as much for industry the roars from the labor camp would crack your eardrums. Mr. Truman seriously said that what the Wage Stabilization Board "recommended" for steel labor was not only right but did not violate the stabilization program.

All efforts of B. F. Fairless, U. S. Steel head, to work out an equitable price increase with stabilization officials failed dismally—as expected. Government has one standard for labor and another for industry—industry gets little or nothing.

It is hard to believe that so many people in high government places know so little about industry. They do not know (nor want to know) what it is up against in investment, research, development and sound fiscal policies. What is happening to steel could happen to any industry.

If the President orders steel taken over, it will be for no other purpose than to force down the industry's throat the WSB recommendations—without proper price relief.

Everyone knows the President will eventually come to see that you can't get blood out of a stone. He will, as he has in the past, realize when trouble starts, that a fair price increase is needed to keep steel companies strong and in business.

If he allows or forces the government to take over the steel industry he will have established a precedent that should make us hide our heads in shame. It will be confiscation—with labor dictatorship.

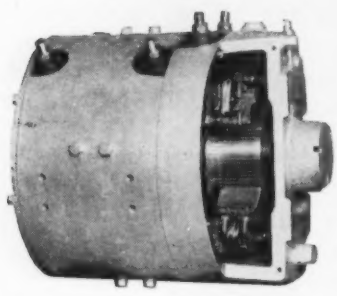
Tom Campbell

Editor

BAKER FORK TRUCKS

do more work per dollar invested

Engineering genius has developed the new Baker line of Fork Trucks for maximum utility, ease and economy of operation, low first cost and minimum maintenance. The electrical and hydraulic components illustrated below are typical of the many built-in features which make this possible.



THE MOST EFFICIENT MOTORS FOR INDUSTRIAL TRUCKS

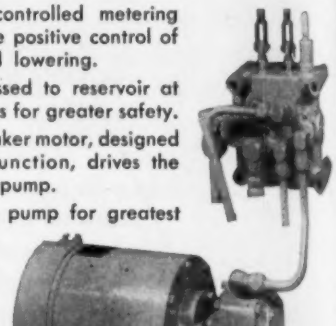
1. Baker designed and built for severe industrial truck service.
2. Cost less to operate because of higher efficiency.
3. Dynamic balanced T-slot armatures wound with rectangular wire for maximum copper in smallest space.
4. Develop highest horsepower for any motors their size and weight because of extra copper.
5. Cool running—can be damaged only by most severe abuse.
6. Heavy forged commutator bars—large brush surfaces for longer life.

THE SAFEST CONTROLLER FOR INDUSTRIAL TRUCKS

1. Exclusive Baker 2-drum, NoPlug, Electric Dynamic Braking Controller.
2. Engineered for maximum protection to battery, motor, drive axle, truck and operator.
3. In decelerating, truck acts as prime mover, motor as generator, to achieve *Dynamic Braking*.
4. Dynamic braking saves wear on mechanical brakes and provides added safety when descending ramps.
5. Advancing through five steps necessary in accelerating to top speed.
6. Plugging impossible when changing travel direction.
7. Speed selection by foot accelerator for operator convenience.
8. Travel direction selected by lever on dash.

THE PRACTICAL HYDRAULIC SYSTEM FOR INDUSTRIAL TRUCKS

1. Low-pressure hydraulic system—less subject to oil seepage than high pressure systems.
2. Danger of dropping heavy loads effectively reduced.
3. Operator-controlled metering valves give positive control of lifting and lowering.
4. Oil by-passed to reservoir at travel limits for greater safety.
5. Efficient Baker motor, designed for this function, drives the hydraulic pump.
6. Gear-type pump for greatest efficiency.



Yours for the Asking!

Just off the press—16 page picture-story manual "CARE and MAINTENANCE OF INDUSTRIAL TRUCKS." Write for your copy today.

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In Canada—Railway and Power Engineering Corporation, Ltd.

Baker® INDUSTRIAL TRUCKS

Dear Editor:

Letters from readers

Commendation

Sir:

Your new format of mill steel prices justifies the highest commendation from purchasing agents nationwide. It makes the check up of price and origin easy and pleasant; and your vertical column coverage of products is a pleasure and a joy.

To one such as the writer, dependent on an absolutely reliable source of trade information, THE IRON AGE again has proved itself invaluable aid.

S. D. KOCH
Director of Purchases
Emergency Steel Service Corp.
Skokie, Ill.

Whose Baby?

Sir:

I have very much enjoyed your publication for several years. Although very small users of steel, your articles and advertisers have many times stimulated our thinking on new methods, procedures and machinery.

Your editorials are a must for me. The last paragraph of the editorial "The Steel Crisis," Mar. 20, is a masterpiece of all times.

When you have a moment to spare could you tell me in this marriage, who is "papa" and who is "mama"?

Maybe the real solution is to build bigger and better orphanages.

J. BROWN 3RD
Treasurer
Frank Smith Silver Co.
Gardner, Mass.

A nice point, but steel is certainly the reluctant stepfather.—Ed.

Quotes

Sir:

We are engaged in the preparation of a manuscript of a booklet dealing with the iron and steel industry and have found, as we have so often in the past, that the research in our line of study has been so greatly facilitated by the data and other material appearing in your splendid trade magazine, THE IRON AGE.

Throughout the manuscript there are many places where we have drawn data for statistical information from your magazine and we would appreciate it if you would give us your permission to use such information, understanding that THE IRON AGE will be duly accredited.

G. S. ARMSTRONG
President
George S. Armstrong & Co., Inc.
New York

Still Galvanized

Sir:

On p. 136 of your Mar. 13 issue there appeared a story on the welding of galvanized angle irons for frames supporting air conditioning coils in the Prudential Insurance building in Houston.

We are particularly interested in this story. Could you tell us the source of information so we may obtain more comprehensive data?

C. B. JACOBS, JR.
American Brass Co.
Waterbury, Conn.

For more details write to the Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 E. 42 St., New York, N. Y.—Ed.

Readers Abroad

Sir:

Last fall I believe you ran an article in three parts entitled "Air Hardening Tool and Die Steels" by Dr. C. B. Post.

We would like to send a reprint of this article to several foreign publications—with the thought that it might be of interest to their readers. Of course, the material would be translated into Spanish and I don't know if it would be used exactly as in your reprint.

The reprint carries on the front page "Reprint From IRON AGE" so that the foreign publication would be aware that the story had been used by you earlier.

May we have your permission to do this?

M. W. NAGLE
Beaumont, Heller & Sperling, Inc.
Reading, Pa.

Compact Torch

Sir:

Your article "Compressed Air, Carbon Arc Speed Metal Cutting" on p. 134 of your Feb. 14 issue discusses the use of a compact Arcair gouging and cutting torch in tests at the National Supply Co.

Would you kindly send me the name of the manufacturer and distributor for this item.

C. R. BURTON
Superintendent of Maintenance
Oliver Iron Mining Div.
U. S. Steel Co.
Hibbing, Minn.

We suggest you write to the National Supply Co., P.O. Box 460, Pittsburgh 30, Pa., for further information.—Ed.

WHERE

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a full day's production . . . every day!

Mr. H. H. Manning, vice president of Champion DeArment says, "What we like about the Lindberg Induction Heating Unit is its accessability for inspection and preventative maintenance. It has been used 8 hours per day since its installation and we have had practically no interruption of production."

Champion DeArment Tool Company, Meadville, Pa., use the Lindberg 2-station Induction Heating Unit to harden their famous CHANNELLOCK pliers. Their unit, like all other Lindberg Induction Heating Units, is designed to give a full day's production every day . . . without costly, irritating breakdowns that skyrocket production costs ☆ ☆ **OVERSIZED COMPONENTS**—oversized components, built into every Lindberg Unit, insures uninterrupted production and hundreds of "bonus hours" of service life ☆ ☆ **SAFETY OVERLOADS**—safety overloads, designed for *any eventuality* protect valuable equipment, reduce rejects and guard against human error ☆ ☆ **"CHECKLITE" TROUBLE SHOOTING**—a built-in "CHECKLITE" system maintains a constant vigil, and when safety overloads operate a signal light indicates the location of the overloads for immediate correction ☆ ☆ For full details on 5, 10, or 25KW Units, write for Bulletin 1440. Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois.

LINDBERG

HIGH FREQUENCY DIVISION

Fatigue Cracks

by Charles T. Post

Wives As Specified

If you were one of the 4 million who read last week's copy of the *Saturday Evening Post*, you may have noticed that your f.f.j.'s Editor Tom Campbell has picked up a strong supporter in his battle to keep wives as individuals.

The *Post*, on its editorial page, has quoted extensively from Tom's Jan. 24 *Iron Age* editorial deploring the demand of some business firms for conformity among not only their executives, but their executives' families.

The *Post* thinks perhaps the wives, themselves, may be the shock troops of the resistance forces. "There are women who don't mind being integrated into the business if it means a solid raise," says its editorial, "but there are also women who can be relied on to say the hell with it." That sounds like a good solid platform for 1952, and we're for any party that adopts it.

Take Noah's Word

It didn't take long for the readers to reach for their unabridged Websters to trace the origin of the steelmaking words tossed our way by J. J. Reich. A. S. Townsend, manager of Cleveland Twist Drill Company's steel inspection division, and Mrs. Olive K. Nesbitt, engineering research librarian for Lord Mfg. Co., came up with the information about the same time.

Deferring to the lady, we find that "bosh" comes from *boschung*, a German word meaning slope; hence, the lower part of a blast furnace where the walls slope. "Cobble," probably of Scandinavian origin, has the same roots as "cob," i.e., something rough, uneven, lumpy. "Ingot" has its roots in the Anglo Saxon words, *in* plus *goten*, past participle of *geotan*, meaning "to pour."

For "sinter," Webster refers to the Anglo-Saxon word, "sinder," and the old Norse word, "sindr," meaning slag, dross, and the German "sinter," meaning ashes. On that score, Webster doesn't give us too good a steer, nor does he on "skelp," coming from the Scotch-Irish and dialect English word, meaning to strike, slap, beat, "Swarf," it seems, is related to the old Norse word *sverfa*, meaning to file, which isn't so far off.

Mrs. Nesbitt volunteers that the reference department of any public library is glad to dig out such information. All you have to do is telephone them.

Taconite

While we're on the subject, G. C. Quinn, Allis-Chalmers Mfg. Co., says he can't find out where the word "taconite" came from. "Seems to be open to argument," he declares.

It certainly does — taconite is jasper in Michigan, magnetite in New York State, and just plain taconite in Minnesota, where it may be either magnetic or nonmagnetic as we get it. "Takonik," of Indian origin, means hard, dense rock—but New York's Taconic mountains have no taconite.

Bang! Bang!

On page 570 of the Jan.-Feb. issue of *Ordnance* magazine is an article, "Aircraft Armament—Our Aerial Weapons Have Not Kept Pace with the Recent Advancements in Aircraft Speed and Performance," and, just nine pages later, another piece, "Our Aerial Firepower — Continuous Development Creates Unbeatable Aircraft."

It just so happens that the derogatory article is by an Air Force general and the laudatory piece by an Army ordnance colonel.

Puzzlers

You can't prove it by us but C. E. Norton says that the answer to his puzzle which appeared last week is 2.7663 cu in. for the small piece and 22.3665 cu in. for the larger one.

The peddler puzzler brought responses from these pricing experts: E. A. Schwab, Emerson Radio Corp.; K. S. Frazier, Detroit Steel Products Co.; Lola E. Hill, Lakeland, Fla.; and R. W. Huff, Canton, Ohio.

J. D. Dupuis, Pittsburgh and C. A. Pipenhagen, Jr., Capson Mfg. Co., have figured out the lake problem, and H. M. Teague, Thomas A. Edison, Inc., has solved the chain puzzle.

R. W. Huff, Canton, Ohio, is responsible for this one. Some steel workers find the door to a room 50 ft long, 40 ft wide and 9 ft high has jammed. The room contains steel beams with a 9 in. by 18 in. cross section, which the workers must get out. The only entrance to the room is through a vertical circular air shaft with a diameter of 3 ft. What is the largest beam which can be taken from the room via the shaft without deformation?

On any steel blackening problem

DEPEND on DU-LITE for a Superior Finish

Courtesy The Poly Choke Co.

Du-Lite gave this part with its complicated knurls, slots, threads, etc. a fine rust-resistant durable black finish. It is typical of many other parts, small and large, which have been black oxidized by Du-Lite for many years. Moreover, Du-Lite meets most individual and government specifications including 57-0-2C for Type III Black Oxide finish.

Du-Lite installations are simple, compact, easy to operate. Du-Lite equipment can be tailored to fit production requirements on all types of jobs with a maximum of speed and economy. Du-Lite also makes a complete line of cleaners, strippers, wetting agents, passivating agents, rust preventatives, burnishing compounds etc. for any metal finishing application.

See your nearest Du-Lite Field Engineer or write for more information.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONN.

Rush information on your metal finishing products.

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Address.....
City..... Zone..... State.....

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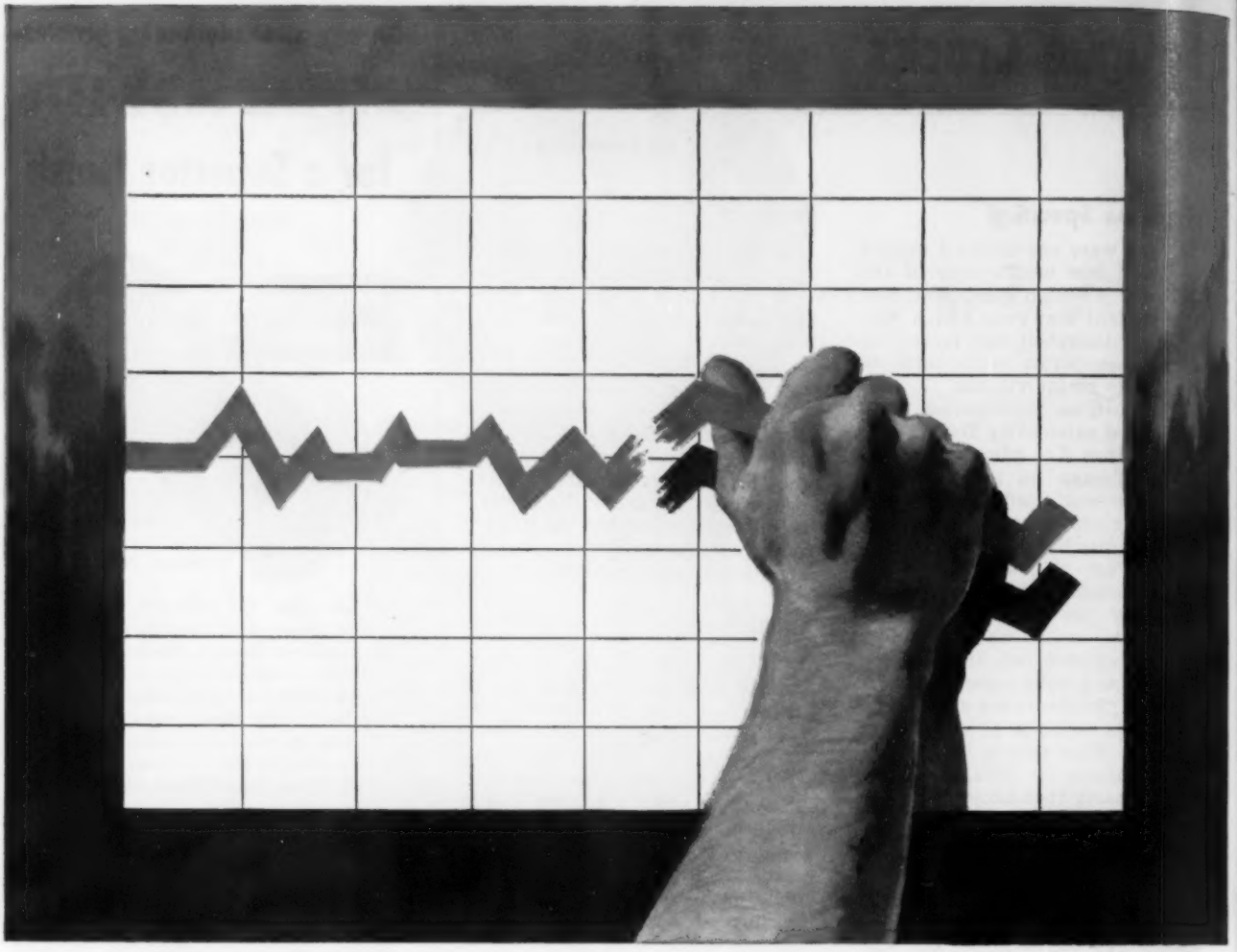
METAL FINISHING SPECIALISTS



How much tonnage does your down-time steal?

EXCESSIVE down-time for bottom repairs steals precious production time—time when your furnace should be making steel!

You can cut costly repairs, greatly increase your tonnage per year, when you install a bottom of Permanente 165 *periclase* ramming mix.

Bonded by means of crystal-bridging, patented Permanente 165 begins formation of a ceramic bond as low as 1500°F—gives a *deeper bond* at normal burn-in temperatures—with no formation of fluids.

Because Permanente 165 has an MgO content of more than 95% after burn-in, *higher refractoriness* is retained longer under operating conditions. *High density* is insured by accurately-sized, pre-shrunk periclase grains.

This means you get a better bottom that requires less time and materials for repair, with far less danger of costly breakthroughs.

YOUR Kaiser refractory engineer will give prompt attention to your refractory problem—will offer, where desired, research, design and installation service to give you maximum production most economically. Write for descriptive literature on Permanente 165 and on the companion ramming mix, Permanente 84. Principal sales offices: *Chemical Division,* Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California. First National Tower, Akron 8, Ohio.

Kaiser Chemicals

Pioneers in Modern Basic Refractories

Basic Refractory Brick and Ramming Materials • Dolomite • Magnesia • Magnesite • Alumina • Periclase

The Iron Age
FOUNDED 1855

THE IRON AGE Newsfront

► Two things may widen use of shell molding. One is possible substitution of urea for phenol in the bonding resin, based on British tests, with a saving of more than half of present resin cost. Another is the theory held by some chemists that they can produce a bonding agent which will harden by a chemical change at room temperature.

► A phenomenon that has escaped notice by many in metalworking is the tremendous growth of powdered iron applications. While other powdered metals have been limited by availability, the automatic production of intricate powdered iron parts with excellent properties — and no machining — has moved steadily ahead.

► One steel company is now supplying transformer grade cold-rolled grain-oriented silicon steel in welded coil form. (Coils are welded of sheets because of difficulty of heat treating coils). This permits manufacture of transformers in coil, rather than laminated sheet form. The product is still in the development stage and is not available for sale to all comers.

► The planetary Sendzimir hot mill which has spent the past few years under test by Follansbee and later by Republic Steel has been sold and shipped to Europe.

► Automakers are concerned over buyer resistance at present prices and fear the effect on prices of a steel price hike. Industry reluctance to raise prices is indicated by the fact that many companies have not taken full advantage of increases allowable under the Capehart Amendment. This attitude is not to be confused with steel producers' failure to apply under that Amendment; theirs was tied up with the wage issue.

► Stainless clad flat rolled — using type 430 — is now being tested. Work is being done on a sandwich using 25 pct of the nickel-saving grade on each side, for a total stainless thickness of 50 pct.

► With steel demand growing rapidly in Africa a new company has been formed there to produce bars, angles and channels. Plans are to use the Krupp-Renn process with 47-pct Fe ore and low grade coal. The company feels the process is well suited to available raw materials and will cost less than conventional blast furnace practice.

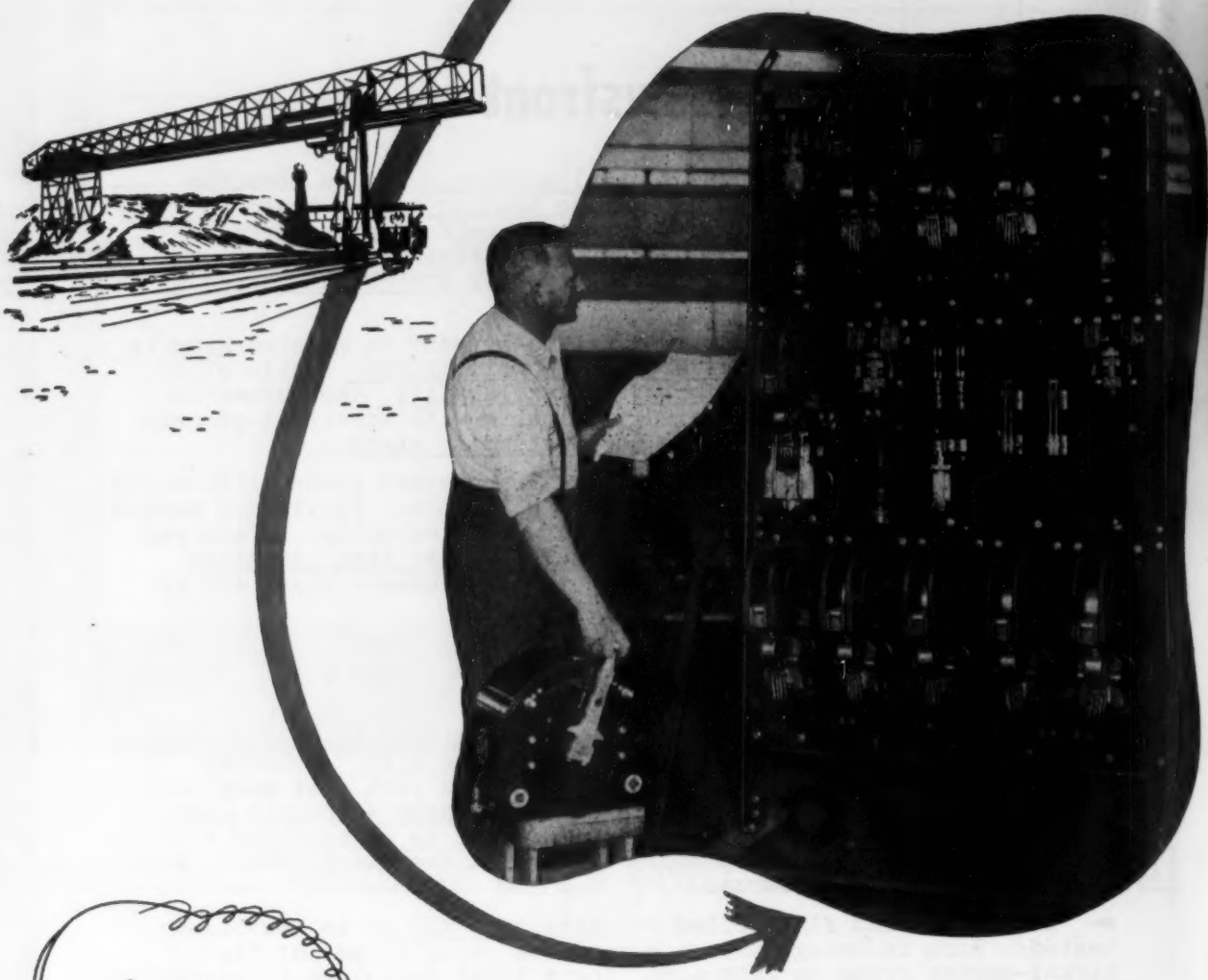
► Tests on a new proprietary olive-drab color zinc coating indicate that it may meet Ordnance and Air Force specifications which can now be met only with a conventional 3-coat paint process.

► In February, for the first time since Korea, shipments of machine tools exceeded new orders. But this doesn't herald the end of the shortage. February's new orders were unusually depressed by cancellations (49 pct of new orders) which were then at a temporarily high point.

► Melt shop experimentation and better application of rammed refractories in induction furnaces now permit one stainless steel shop to increase the number of 6500-lb melts obtained per lining from 40 or 50 to over 150.

► Parents note: There's talk in Detroit that a manufacturer not now producing a sports car is thinking of going into production of a "hot rod" this year.

Helps Speed Ore Movement



In 1912, fifty steel mill men came to Cleveland to witness the first dynamic lowering hoist control—when EC&M demonstrated that loads could be safely handled and the expensive-to-maintain mechanical load brake could be eliminated.

THIS TYPICAL EC&M CONTROLLER (and a duplicate) will soon be placed in service to control the hoisting, lowering, opening and closing of a two-motor bucket hoist on an ore bridge.

For this and similar crane-hoist applications, EC&M Control Apparatus and Control Engineering have earned a reputation for quick, easy manipulation of material handling equipment. Less tiring to the operators, this EC&M equipment enables them to maintain high output *continuously*. And maintenance men know that magnetic controllers using EC&M LINE-ARC Contactors are unequalled for low maintenance.

EC&M Crane Controllers are fast—and safe, too.

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BAUXITE: Jamaican Ore Will Reach U. S. Soon

Reynolds completes project, expects to ship 750,000 tons per year . . . Human engineering had prime spot—*By Tom Campbell.*

Seeing is not always believing. Nor is knowledge always the key to success. Accident plays a big part in our lives. It plays an even bigger part in discovery of nature's treasures.

So it was in Jamaica, B. W. I., in 1942. Then, Sir Alfred D'Costa was turning over ground to grow better grazing grass. He had no thought of aluminum; nor did he know of Reynolds Metals Co. Nor did they know of him.

Samples of Sir Alfred's ground were tested and showed a high alumina content. How big the discovery was — despite repeated study of Jamaica by geologists—was the biggest surprise of all.

Not dreaming of Korea nor of a $60 billion a year defense budget Reynolds Metals Co. heard of the bauxite discovery. They were looking to the great future of aluminum and were going to be a part of it.

No Time Wasted—When Richard Reynolds heard the news of the Jamaican discovery his company got on the ball fast. The late O. C. Schmedeman, then Reynolds Mining Corp.'s vice-president and chief geologist, made a complete survey. What he found flabbergasted him. Here was one of the greatest discoveries of bauxite in this hemisphere.

The Jamaican government was unable to interest the British aluminum industry in the bauxite. Canadian interests were lukewarm (they later obtained concessions of a smaller magnitude than Reynolds').

Sparked by Walter L. Rice, president of Reynolds' Jamaican subsidiary, a working agreement was made with the Jamaican government. Eventually an ECA loan was worked out with the United States. Much time and money had been spent analyzing and testing the bauxite which is more similar to that used in Europe than in the United States.

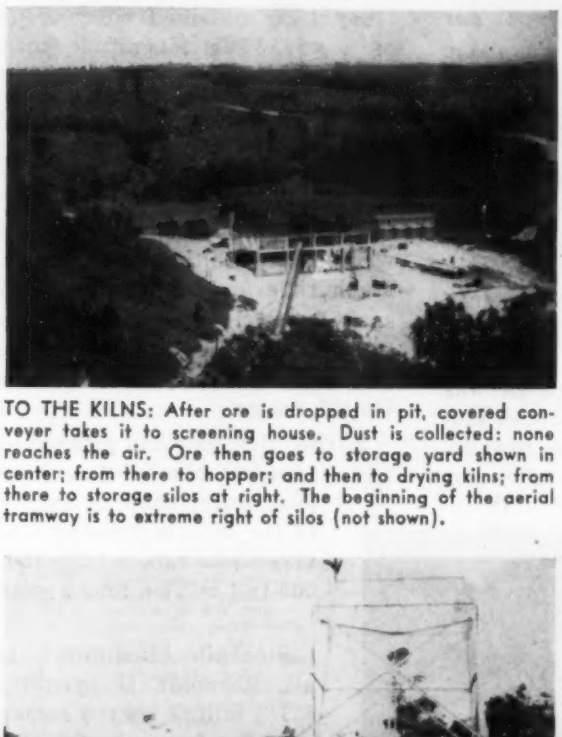
Earlier Reynolds had planned on taking 400,000 tons of bauxite a year from Jamaica. Because of the defense program that target now ranges from 750,000 to 1 million tons a year.

TALKING IT OVER: Bill Cole, resident manager, (left) compares notes with Tom Campbell, Iron Age editor, (right) at the Jamaica-operations.

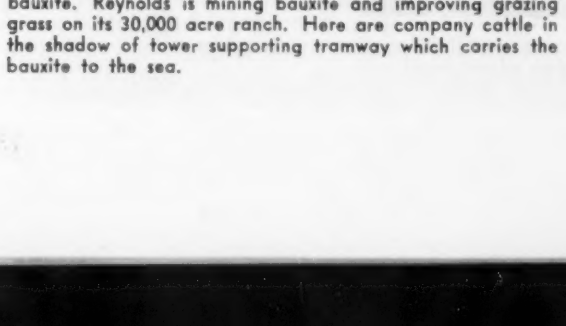
Stockpile Aluminum — In all, Reynolds is spending $17½ million on the Jamaican development. Of that amount more than $14½ million will be repaid to our government in aluminum to go to our strategic stockpile. Repayments will be made over a period of 20 years at 4 pct interest.

The company's policy is to "put more back into Jamaica than is taken out." This involves pilot dairy and farm

EASY PICKIN'S: Euclids scooping bauxite from mine site. It is a few inches under top soil which is replaced when the mine is worked out. Ore is about 6 miles from shipping pier and reaches it by conveyers and aerial ropeway. Total reserves are about 300 million tons of low silica bauxite, running about 50 pct alumina content.



TO THE KILNS: After ore is dropped in pit, covered conveyer takes it to screening house. Dust is collected: none reaches the air. Ore then goes to storage yard shown in center; from there to hopper; and then to drying kilns; from there to storage silos at right. The beginning of the aerial tramway is to extreme right of silos (not shown).



GRAZING IN BAUXITE: Reynolds is finishing what Sir Alfred D'Costa started. He looked for good grazing grass and found bauxite. Reynolds is mining bauxite and improving grazing grass on its 30,000 acre ranch. Here are company cattle in the shadow of tower supporting tramway which carries the bauxite to the sea.

experimentation on its extensive grazing and farming acreage. Native Jamaicans have already been able to take advantage of these experiments which are under the supervision of Keith Coxe, the company's genial ranch manager.

Agriculture techniques are being worked out to raise vegetables, grains, better cattle grazing grass. Enrichment of the soil through proper plowing and fertilizing is a prime project. Jamaicans are being shown what is being done and are invited to take advantage of the company's work. That means more and better food for the natives and an even better relationship between Jamaicans and a U. S. company anxious to cooperate fully with the Crown colony.

Bill Cole, resident manager of the development, has lain awake nights worrying about schedules. His efforts and those of his superintendent of operations, Dick Williams, have paid off. The first run of ore from the mines to the dock 6 miles away took place within the past few days. Despite material shortages and the need to teach Jamaican labor how to run complicated machinery and increase capacity the company is only slightly off the original target date.

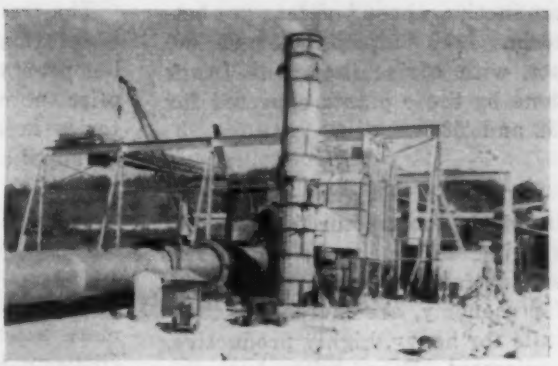
AHEAD OF THE GAME: Here is a stockpile of bauxite (See arrow) ne

TO THE SHIPS: Silos take nodulized bauxite from end of the aerial ropeway. By conveyer it goes underground to pier. Conveyers take it to moving loader which drops material into ship at a rate of 1400 tons an hour. A self-unloading Vickers-Armstrong vessel, to be delivered, will be loaded in 8 hr. Turnaround for the tramway buckets is to the left.

Shorter **Shipping**—Jamaican bauxite ore—50 pct alumina and 1 to 3 pct silica—will supplement Reynolds high silica ores in Arkansas. It will be shipped a distance of about 1000 miles to gulf ports. This is shorter by 1500 miles than the trip from the Guianas. Aside from cheaper transportation this would be advantageous in case of submarine warfare.

All told, Reynolds will use about 1,600,000 tons of bauxite a year of which 1 million tons will eventually come from Jamaica. In Jamaica, minerals belong to the government but private capital obtains the right to mine and ship them out. Reynolds' relationship with the government and with labor has been most excellent on the basis of the writer's first-hand observation.

The mines are located about 6 miles inland from Ocho Rios Bay, on the north coast of Jamaica, 55 miles north of Kingston. Close by are some of the world's most beautiful resort spots. Because of dust elimination, farm land and flower and tree beautification one would never know that a million tons of bauxite would be rolling toward Ocho Rios Bay each year to be transported to the United States.



NODULIZING KILNS: These two kilns take ore from hopper and nodulize it so that 90 pct of the water is removed. Dust is eliminated during this operation. In natural state this bauxite is about 30 pct moisture. With moisture removed the bauxite goes to storage silos: from there to aerial tramway and on its way to the loading pier.

PRIZE POSSESSION: Keith Coxe, Reynolds' ranch manager (who also has a green thumb) is proud of this $3500 prize Brahman bull. It started a new crop of high quality cattle in Jamaica. The bull's descendants will be around during the next hundred years or so while bauxite is being removed. This fits into Reynolds plan to "put in more than it takes."

mines. About 20,000 tons were piled awaiting completion of tramway.

TRACTORS: Farm Demand Stays High

Agricultural equipment sales heading for a record year . . . Output rising in spite of more defense work . . . Farmers ask heavier models with more production — *By K. W. Bennett.*

In the face of softening farm prices, demand for farm equipment is holding well in the opening quarter of a bumper year for farm implement manufacturers.

Last year was a record sales year. With the exception of '49 and '50, implement sales have been shooting up like the good green corn since 1946, when implement companies began chopping away at a backlog accumulated during World War II.

In 1952, with as much as 10 pct of output devoted again to war production, these builders are bettering 1946 output by 50 to 100 pct, with a rise in defense work done by these plants expected for '52 and '53.

Build 'Em Bigger—Several trends in the tractor field are beginning to emerge clearly. The men on farms, needing to engineer for economy, are increasing their calls for heavy, highly productive, equipment. Faced with shortages of manpower, advancing average age in farm operators, and expanding farm acreages, the American farmer is buying more tractors in the 35 hp and 3-plow classes. The same is true in his purchases of combines, grain drills, hay balers, and corn planters.

Light tractors consistently outsell heavier models. Wheeled tractors sold 126,840 in the fourth quarter of '51; heavier tracklaying models sold 13,248. But while light tractors have fluctuated, heavies have climbed consistently through even the weak market of 1950.

The heavies are climbing; tracklaying types are a solid and steady demand; diesels and liquefied petroleum gas types are moving up on the light, gasoline driven models that built our farm economy. In the wheeled tractor class, a heavy diesel has, however, remained in heavy demand and illustrative of the sturdy market for heavy tractors.

LP gas models, limited in distribution by need for nearby supplies of their specialized fuel, are expected to climb with the expanding pipeline program. LP users declare that their fuel is more powerful than the diesel and less subject to taxes. LP tractor use has been expanding considerably in the West.

The trail ahead, like the way of temptation, is seemingly pleasant but pit-trapped. At least one supplier notes that dealers' inventories in several of the machines he supplies are well up over last year. One large supplier indicated that supply is running closer to demand than at any time since Korea. And dealer-salesmen for a leading Midwest firm will have more extensive sales training facilities available for their use.

Since light tractors are interrelated with farm prices, implement builders have eyed warily a softening in farm prices. A bright spot here is the expanding use of midget garden tractors. Each spring a fresh crop of suburbanites and townsmen are power-equipping their gardens.

"I pity his crew today."

Shortages still burden the farm equipment producer. There are still CMP tickets going unfilled, brass and copper are still dragging, and forging quality bars and rounds are tight as new shoes. Boron use has increased considerably, although the implement field has always been a notable pioneer in the use of this steel type. Resultingly, some equipment lines are in mouth watering supply, but a heavy special purpose tractor might take several months in delivery.

Operating costs and taxes have increased across the board. This has gone as far as the distributor level; the number of dealerships has fallen and the capital investment in those remaining has increased.

Equipment demand is still good—a steel strike could make it acute.

Foundries:

Government may build facilities for more heavy casting output.

Construction of foundries at government expense to assure sufficient production of heavy steel castings to meet defense power programs may be in the offing.

Such a move seemed indicated last week as the National Production Authority prepared to create a task group, composed of members of the industry, to go into the question of capacity, possible expansion, and related matters.

Officials claim that current mobilization plans make it evident that existing capacity is not enough to produce the tonnages of heavy castings needed for the future.

Won't Pay—The matter was brought up at a recent conference between National Production Authority and representatives of 16 heavy castings companies. It was indicated that the industry has no intention of using its own money to build more heavy castings capacity.

STEEL: Peace Offensive Stalls

Early this week it did not seem that enough gain had been made to avert strike . . . Only a fraction of industry could operate . . . Murray refuses industry's offer—*By Tom Campbell.*

Negotiations early this week had not laid enough groundwork to prevent the steel industry from starting on its way to a complete shutdown. Optimism and pessimism were running hot and cold. Phil Murray, chief of the steelworkers' union, held out for all Wage Stabilization Board recommendations.

The pattern of authoritative opinion was running this way. As soon as a solid basis had been reached to settle wages, the industry saw itself getting a larger price increase than the $2 to $3 a ton originally offered by OPS. The increase would not be what the industry had demanded. It may range around $5 a ton, or perhaps slightly more.

in negotiations, the dispute could be expected to reach Truman.

Only a very small part of the industry—covered by independent unions and by special contracts with the CIO steelworkers union—were to operate during the latter half of this week. IRON AGE estimates that—assuming no last minute miracle—the steel industry will lose close to 1,000,000 net tons of steel this week because of the strike.

Dashed Hopes—Late last week and early Monday of this week optimism behind the scenes had been ready to take on a much stronger tone. Some sources had looked for a more conciliatory attitude on the part of Philip Murray, steelworkers' union chief. Some had thought that the WSB recommendations could be pared down a little so that a common ground for further collective bargaining could be established.

On Monday and Tuesday Nathan P. Feinsinger shuttled between the union group and the company group representing the six large steel firms. While Mr. Feinsinger refused any comment on the question, "Are you attempting to modify the WSB recommendations?" It was known that that was one of his objects in coming to New York late last week.

The steel companies late last week made their initial offer of 9¢ an hr, plus fringe benefits which would bring it up to a cost of 16¢ an hr to the steel firms. Mr. Murray flatly refused this offer.

Another Rejection — Suddenly on Monday afternoon, following Mr. Feinsinger's attempts to find a common ground for negotiations, Mr. Murray flatly rejected what was believed to be a slightly better offer by the steel firms. He not only rejected whatever offer was made, but he threw things back where they were last week by insisting that the union obtain the complete WSB recommendation of 26¢ an hr and the union shop.

The slender thread of hope that some settlement can be reached late this week or some time next week is chock full of big if's. Apparently the steel industry has complete confidence that the government will offer an equitable price increase providing a negotiated agreement is reached with the union.

PRICE RISE . . . It was hoped Ellis Arnall (left), OPS chief, would unbend that deaf ear he had turned on U. S. Steel's B. F. Fairless when the talk concerned higher steel prices.

Since the government had been making dictatorial threats on industry seizure, steel companies were expected this week to seek a court injunction against that action. Some paring of the union's demands may be in the cards, also. Settlement may be about 15¢ an hr plus 5¢ to 7¢ in fringe benefits. The union shop issue might be discarded by Mr. Murray, if he gets a good economic package.

If a final cleavage was reached

"SPONTANEOUS" . . . Phil Murray quiets demonstration of union men.

PRE-FABS: Gunnison to Use Steel

U. S. Steel subsidiary to switch from plywood to metal . . . Will build military shelters at new plant . . . Hope for early start . . . Surplus sheet steel expected — *By E. C. Beaudet.*

Announcement last week by Gunnison Homes, Inc., of plans to build all-steel military shelters may foretell U. S. Steel's entry into the steel pre-fab housing field.

While initial production will be pointed towards the military, the steel company's subsidiary can be expected to eventually put out an all-steel house. Top officials of U. S. Steel are said to have been spurring plans for over 1 year to get into production.

Gunnison will build a new 260,000 sq ft. plant at Shermanstown, near Harrisburg, Pa., to produce the shelters. Ground will be broken around the end of May and construction is expected to be finished in 10 to 12 months.

Timing of the venture seems to be just about right. With the threat of an over-supply of steel worrying the industry, it should take up some of the slack. Barring an all-out war and a strike of long duration sheet steel is expected to be very easy by the time the new plant is finished.

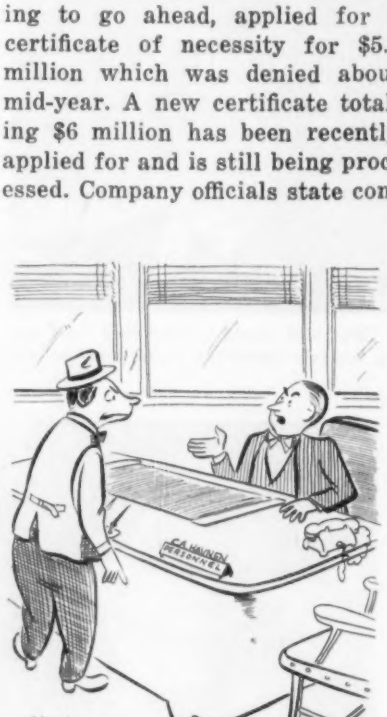
Nearby—Location of the plant near Harrisburg will enable Gunnison to draw on the sheet production of the nearby Irvin Works of U. S. Steel and the new Fairless Works at Morrisville, when completed. Market potential for prefabricated homes looks good. A quarter million prefabricated dwelling units have been sold since the war and the industry expects to supply 8 pct of all new homes built during 1952.

The Gunnison plant at Harrisburg has a population of 40 million people within a 350-mile trucking radius. When and if production is switched to domestic units will depend to a great extent on military needs and the future housing market.

Know-How — Gunnison's entry into the all-steel home field would be a natural outgrowth of its affiliation with U. S. Steel. In 1944 the corporation bought out the controlling interest in Gunnison. The know-how in design and construction of Gunnison engineers coupled with the metallurgical and fabricating knowledge of U. S. Steel personnel make a top-flight combination.

At the beginning of last year Gunnison became a wholly owned subsidiary at about the same time the plant site was purchased. U. S. Steel previously had been approached by the Reconstruction Finance Corp. about taking over the distressed Lustron enterprise. Unfavorable publicity surrounding the Lustron venture was one of the factors working against such a move.

Last January Gunnison, deciding to go ahead, applied for a certificate of necessity for $5.5 million which was denied about mid-year. A new certificate totaling $6 million has been recently applied for and is still being processed. Company officials state construction will go ahead whether a certificate of necessity is granted or not.



"George, the men are complaining that you've been barking at them lately."

Expected—As of last week, National Production Authority said no application had been made for a construction permit or allocation of materials. However, it is assumed they will both be forthcoming in view of Defense Production Administration's urging commercial and industrial builders to file their plans immediately and assurance that a substantial quantity of materials will be made available in the third quarter.

The military structures to be made in the new plant are completely demountable, portable, fireproof, termite-proof and hurricane-proof, suitable for any climate. They have a variety of uses including field hospitals, barracks, mess halls and warehouses. They will be shipped directly from Harrisburg to the point of construction.

Regardless of their final shape and size Gunnison shelters will all be built of standard sections with no single part weighing more than can be carried by two men. A standard building 20x48 ft can be erected by two men in 1 day. Shipping weight of a standard building is 13.5 tons and shipping volume is 1000 cu ft.

Firms to Build Test Housing

U. S. Housing & Home Finance Agency has kicked off a special dry-run for testing the suitability of mobile and demountable housing by selecting seven firms for production of the test units.

Firms which have been selected to produce the test units, looking to endorsement for defense housing use, are:

Pressed Steel Car Co. of Chicago; Acorn Houses, Inc., of Concord, Mass.; Mobilhome Corp. of America, Bakersfield, Calif.; TransaHouse, Inc., Long Beach, Calif.; South Bend Fabricating Co. of Seattle; Knox Corp., of Thomson, Ga., and Nicoll Lumber Co., Redwood City, Calif.

CEILINGS: Inventory Curbs Eased

Restrictions on ferrous and chemical stocks raised to 60-day level . . . Working inventory basis established by shift from NPA Reg. 1 to CMP Reg. 2 . . . Pig iron, castings affected.

Inventory restrictions were eased in several directions last week, including the increase of pig iron ceilings to a 60-day stock instead of previous levels.

At the same time, all inventory controls were wiped out for 25 assorted items, mainly chemicals. Fourteen other items were transferred from inventory regulation under National Production Authority Reg. 1 to that of Controlled Materials Plan Reg. 2.

Also raised to the 60-day limit status were gray iron and malleable castings, both rough and semi-finished, and steel castings, rough as forged.

Steel Drums — Inventories of steel shipping drums and metal reels and spools were given the same 60-day provisional status as steel strapping—with the proviso that users who customarily buy in carload or similar large lots may not accept such delivery until inventories have fallen below 45 days.

Cast iron pressure pipe and fittings were added to Table 1-A of NPA Reg. 1, making them subject to working inventory provisions. Likewise placed on the 1-A list were ceramic grades of fluorospar, cryolite and platinum, zinc chloride, and zinc ammonium chloride.

Also Transferred—Other items removed from inventory restriction under Reg. 1 and placed under Reg. 2 were:

Nickel-, Iconel-, and Monel-clad alloy steels; copper- and aluminum-clad carbon steels; roofing and galvanized, corrugated, V-crimped and channel drains; valley and flashing ridge roll; corrugated and brick siding; welded and woven wire; steel cut, galvanized, cement-coated and painted spikes, nails, and brads; galvanized staples; rope and strand wire.

Effective immediately, these actions were taken under amendment of NPA Reg. 1.

Carbon Steel Export Quotas Hiked

An additional 31,000 tons of carbon steel wire, wire products, and wire rods have been made available for second-quarter export at the request of Mutual Security Agency and with approval of Office of International Trade.

This brings second-quarter export quota of CMP carbon steel to 383,678 tons. However, exports against the supplementary allocation will be licensed only on showing that the materials are available from mills or other sources.

IMC Nickel, Cobalt Quotas Set

A slightly higher availability of primary nickel and oxides will result in distribution of 34,964 metric tons during the April - June quarter, International Materials Conference has calculated.

In the preceding quarter, apportionment of 33,583 tons was recommended by the agency. Expected increase is scheduled to come from the recently-reactivated Nicaro plant in Cuba and from French New Caledonia.

The U. S. is in line to receive 23,726 tons of nickel and oxides. Thirty-four other free-world areas are slated to get amounts ranging from less than a ton to 5325 tons.

Cobalt distribution, as recommended by IMC for the first half of 1952, would include 2762 metric tons for the U. S. of a total 4413 tons estimated to be available.

Industry Controls This Week

Aluminum Foil — Amended M-67 establishes minimum and maximum levels of use to give preferential treatment of orders when a converter's supply is insufficient.

Chemicals—Sellers of certain chemicals on long-term contracts may apply to OPS for permission under GOR 27 to use previous contract prices instead of existing ceiling prices.

Heating Equipment — Manufacturers of heating, plumbing and refrigeration equipment and of industrial valves have been exempted from OPS Form 128 by Amend. 43, CPR 22. SR 25, CPR 22 allows manufacturers of automatic heating controls to fix ceiling prices at 3.9 pct over ceilings established under GCPR.

Inventories—Restrictions on metal and chemical items raised to 60-day level. Working inventory basis established by Amend. NPA Reg. 1, transferring affected items to CMP Reg. 2.

Nonferrous Scrap—Amend. 2, CPR 43 and Amend. 2, CPR 53 permit computation of weight of zinc scrap and battery lead scrap at point of shipment on sales by the government.

Petroleum & Gas Industries—Dir. 2, M-46 allows small operators who received priorities aid in first quarter on purchases of tubular goods, but who were unable to place orders, to file for new allotments.

Shipping—Amended M-70 eases requirements for obtaining MRO parts. SR 91, GCPR allows individual contract water carriers to apply for price increases to compensate for higher costs.

Steel—Dir. 2, M-1 requires NPA approval for all orders for light gage carbon steel plate after July 1.

Tanks—Makers of automotive cargo tanks and of range boilers may price under either CPR 30 or GCPR. (Amend. 4, SR 3, CPR 30.)

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STEEL: Earnings Hit the Skids

Industry shatters production, shipment, sales records . . . But net earnings fall . . . Higher taxes hit hardest . . . Other costs also rise . . . Price control hurts—*By J. B. Delaney.*

Higher taxes and operating costs coupled with price control sent steel industry profits into a tailspin in 1951, according to a survey by THE IRON AGE.

Of the 27 steel producers listed in THE IRON AGE Financial Analysis for 1950-1951, only nine reported higher earnings in 1951 over the previous year. Net income for the whole group was off 13.2 pct.

No Relief Seen—With the producers facing the prospect of still higher wage and other costs, this trend is expected to continue in 1952 unless price controls are relaxed to compensate. At the moment, the industry has little reason for optimism.

A 21.7 pct increase in net sales and operating revenue was more than offset by a 59.6 pct boost in Federal income taxes for the 27 companies, which represent 90 pct of the nation's ingot capacity. Net income percent of sales dropped from an average of 8.0 pct in 1950 to 5.7 pct in 1951—a decline of 28.7 pct.

Look at the Banks—The figures show net sales and operating revenue in 1951 of $11,126,397,324 compared with $9,137,146,720 in 1950. Federal income taxes rose from $752,012,816 in 1950, to $1,201,244,173 in 1951. Profits dropped from $732,012,816 in 1950 to $635,269,756 in 1951.

For the industry as a whole this would indicate net sales and operating revenue of approximately $11.2 billion for 1951, while profits for the entire industry would be about $700 million. Federal income taxes would run about $1.3 billion.

E. T. Weir, chairman of National Steel Corp., asserts that the combination of high taxes and low tax allowance for depreciation places a probable heavier tax burden on American industry today than on industry anywhere else in the world. He expects 1952 earnings to be down another 15 pct.

Stockholders Squeezed — Steel industry common stockholders also felt the squeeze. Despite a 13.2 pct increase in the number of common shares outstanding, dividends declared dropped from $251.8 million in 1950 to $245.3 million in 1951, a decline of 2.6 pct.

This at a time when the industry has more reason than ever to woo the stockholder, whose money is needed to help finance present and future expansion. Steel producers are well aware of this, and one of the most important problems facing management is that of attracting more investment capital to the industry.

Both preferred shares outstanding and preferred dividends declared were up—17.6 pct and 3.8 pct, respectively.

Impact of Expansion — Funded debt rose 31.8 pct—from $767,824,926 to $1,012,246,797. Invested capital was up 12.0 pct, increasing from $5,958,063,263 in 1950 to $6,671,436,089 in 1951. Working capital was off 1.7 pct. Capital per ton of ingot capacity rose 13.8 pct. Net income pct of investment declined 22.8 pct.

The increase in funded debt and invested capital was a reflection of the tremendous sums spent by the producers in expanding ingot capacity—an expansion encouraged by the government through accelerated tax amortization in the interest of national defense.

During 1951 the industry's capacity rose from 104.2 million ingot tons to 108.5 million. The industry is expected to add approximately 1 million tons capacity per month during 1952, as it moves toward a goal of about 120 million tons.

With this increased capacity, steel production is expected to equal demand some time in third quarter, barring a long strike which would change the whole picture.

The Top Twelve

Net income, in thousands of dollars, of 12 steel companies rated in order of reported 1951 profits, with pct of change from 1950 is as follows:

Company	1951	1950	Pct of change
U. S. Steel Corp.	$184,359	$215,464	— 14.4
Bethlehem Steel Corp.	106,531	122,976	— 13.4
Republic Steel Corp.	54,921	63,794	— 13.9
National Steel Corp.	45,287	57,814	— 22.0
Armco Steel Corp.	35,004	47,000	— 26.0
Inland Steel Co.	34,398	38,015	— 9.5
Jones & Laughlin Steel Corp.	30,998	39,744	— 22.0
Youngstown Sheet & Tube Co.	30,644	40,616	— 24.6
Wheeling Steel Corp.	17,392	18,314	— 5.0
Colorado Fuel & Iron Corp.	10,382	4,406	+135.6
Sharon Steel Corp.	8,861	9,284	— 4.6
Kaiser Steel Corp.	7,510	11,940	— 37.1

COMPANY	Year	Ingot Capacity Net Tons	Ingot Production Net Tons	Percent of Capacity Operated	Steel Shipments Net Tons	Net Sales and Operating Revenue	Provision for Federal Income Taxes	Net Income	Net Income Percent of Sales	Number of Common Shares Outstanding	Earnin Per Commo Share
U. S. Steel Corp.	1951	34,600,000	34,323,000	101.3	24,626,000	3,524,121,226	398,000,000	184,359,787	5.2	26,109,756	6.10
	1950	33,900,000	31,457,000	98.2	22,635,000	2,956,406,146	234,000,000	215,464,142	7.3	26,109,756	7.29
Bethlehem Steel Corp.	1951	16,000,000	16,405,677	102.5	12,138,732	1,799,506,346	162,000,000	106,531,293	5.9	9,582,942	10.43
	1950	15,000,000	15,116,456	100.8	10,933,296	1,445,404,331	122,000,000	122,976,071	8.5	9,582,942	12.15
Republic Steel Corp.	1951	9,490,000	9,142,096	102.0	6,993,619	1,052,715,386	117,500,000	54,921,541	5.2	5,896,719	9.03
	1950	8,967,000	8,551,013	98.3	6,388,157	881,753,328	79,200,000	63,794,711	7.2	5,896,719	10.53
Jones & Laughlin Steel Corp.	1951	4,847,000	5,032,000	104.0	4,000,000	564,330,000	54,339,000	30,998,000	5.5	6,200,654[8]	4.76
	1950	4,847,000	4,944,000[4]	102.0	3,844,000	487,451,000	33,850,000	39,744,000	8.2	2,600,327	14.72
National Steel Corp.	1951	4,750,000	.....	.....	.....	619,461,408	95,000,000	45,287,093	7.32	7,362,045	6.15
	1950	4,500,000	.....	.....	.....	537,024,673	61,100,000	57,814,974	10.77	7,362,045	7.85
Armco Steel Corp.	1951	4,525,000	4,357,562	96.3	3,386,554	534,834,687	69,141,292	35,004,487	6.54	5,214,997	6.69
	1950	4,330,000	3,958,727	91.4	2,976,293	439,296,931	48,173,228	47,000,505	10.70	3,954,333	11.76
Youngstown Sheet & Tube Co.	1951	4,370,000	4,451,854	104.7	3,362,104	489,305,162	38,692,000	30,644,201	6.34	3,350,016	9.15
	1950	4,250,000	4,124,781	101.0	3,031,676	409,898,010	33,820,000	40,616,403	10.05	3,350,016	12.12
Inland Steel Co.	1951	3,750,000	3,837,268	102.3	3,596,888[7]	521,449,655	53,520,000	34,398,585	6.6	4,899,315	7.02
	1950	3,750,000	3,675,707	102.8	3,406,564[7]	461,376,600	41,224,700	38,015,676	8.2	4,899,315	7.76
Wheeling Steel Corp.	1951	1,860,000	1,874,236	100.8	.....	229,012,621	33,662,000	17,392,959	7.59	1,423,897	10.96
	1950	1,800,000	1,636,475	94.7	.....	186,723,442	17,342,000	18,314,517	9.81	1,423,897	11.59
Sharon Steel Corp.	1951	1,550,000	1,600,205	103.2	1,128,433	169,961,946	18,480,000	8,861,187	5.2	1,100,000	8.06
	1950	1,441,400	1,448,978	100.5	1,047,795	136,120,769	9,620,000	9,284,643	6.8	925,863	10.03
Colorado Fuel & Iron Corp.	1951[6]	1,522,664	1,615,246	106.08	1,708,855	191,444,412	18,936,500	10,382,228	5.42	2,000,523	5.06
	1950[6]	1,472,000	1,198,531	81.42	1,115,504	112,642,939	2,704,300	4,406,226	3.91	1,191,096	3.30
Kaiser Steel Corp.	1951[6]	1,380,000	1,217,196	101.4	889,420	100,471,475	6,690,017	7,510,561	7.5	3,200,000	1.86
	1950[6]	1,200,000	1,101,961	104.6	770,802	84,480,816	8,100,000	11,940,593	14.1	1,000	None
Crucible Steel Co. of America	1951	1,198,960	.....	.....	.....	202,868,727	18,099,421	8,363,225	4.12	574,362	11.89
	1950	1,153,455	.....	.....	.....	147,807,941	8,200,523	6,311,254	4.27	488,680	9.73
Pittsburgh Steel Co.	1951	1,072,000	1,091,364	100.8	1,140,539	150,462,914	16,071,000	7,331,599	4.87	1,091,915	5.99
	1950	1,072,000	1,074,340	100.22	1,001,297	119,185,237	6,510,000	6,350,410	5.33	931,048	6.13
Barium Steel Corp.	1951	893,000	627,220	70.23	None	91,642,638	8,665,674	4,164,177	4.5	2,230,910	1.87
	1950	893,000	471,095	54.0	None	53,523,876	1,752,942	1,474,226	2.8	2,223,402	.66
Allegheny Ludlum Steel Corp.	1951	817,200	817,058	100.0	676,960	229,090,224	20,190,000	8,834,140	3.86	1,627,169	5.40
	1950	832,360	701,569	85.5	617,710	177,961,693	10,250,000	9,814,891	5.52	1,320,651	7.07
Granite City Steel Co.	1951	720,000	746,911	103.7	821,198	86,773,193	7,980,000	5,142,520	5.9	1,278,462	4.02
	1950	620,000	681,510	109.9	555,858	60,234,883	5,420,000	5,727,406	9.6	497,201	11.52
Lukens Steel Co.	1951	675,000	686,083	101.64	541,376	80,546,418	8,805,500	3,549,367	4.4	317,976	11.16
	1950	675,000	621,761	92.11	439,067	52,935,861	1,505,834	1,922,037	3.63	317,976	6.04
Detroit Steel Corp.	1951	660,000	644,788	97.7	780,940	113,747,043	21,812,229	10,514,896	.092	1,185,793	8.87
	1950	660,000	653,983	99.1	805,689	92,949,234	8,615,770	8,943,140	.096	1,185,793	7.54
Alan Wood Steel Co.	1951	625,000	623,232	99.7	465,231	58,764,602	4,192,000	2,303,720	3.9	594,107	3.32
	1950	550,000	485,607	88.3	337,415	44,954,826	1,745,000	2,546,902	5.7	562,202	3.92
Copperweld Steel Co.	1951	554,400	.....	.....	.....	76,185,026	5,510,000	2,703,165	3.5	514,864	5.14
	1950	554,400	.....	.....	.....	55,596,047	1,800,000	2,572,539	4.6	514,864	4.88
Rotary Electric Steel Co.	1951	425,000	372,146	87.6	279,862	40,993,056	5,015,000	2,482,974	6.1	290,413	8.55
	1950	425,000	392,764	90.1	307,433	31,103,586	1,910,000	2,150,170	6.9	193,676	11.10
Laclede Steel Co.	1951	410,000	389,662	95.0	360,230	47,657,001	5,075,000	2,797,998	5.87	206,250	13.57
	1950	397,845	360,668	90.7	332,426	39,615,464	3,383,000	3,222,475	8.13	206,250	15.62
Keystone Steel & Wire Co.	1951[11]	400,000	323,956	81.0[10]	264,809	44,406,154	6,130,840	4,724,286	10.64	1,875,000	2.52
	1950[11]	325,000	342,489	105.4	295,686	43,206,187	5,609,721	6,477,387	14.99	1,875,000	3.45
Continental Steel Corp.	1951	394,000	363,484	92.3	280,501	39,866,978	4,150,000	1,530,371	3.84	501,361	3.05
	1950	393,765	372,138	94.5	282,802	36,428,123	3,220,000	2,660,153	7.30	501,361	5.31
Northwestern Steel & Wire Co.	1951	321,000	338,690	105.5	279,652	42,981,692	3,586,700	2,915,271	6.8	817,825	3.56
	1950	321,000	282,974	88.2	237,790	31,670,380	1,590,000	2,416,222	7.6	817,825	2.95
The Midvale Co.	1951	274,654	119,902	43.65	.....	23,797,334	.....	1,619,925	6.81	600,000	2.70
	1950	417,624	51,420	12.31	.....	11,394,397	.....	51,143	0.45	600,000	0.09
GRAND TOTAL	1951	98,084,178	98,968,000	100.9	71,000,000	11,126,397,324	1,201,244,173	635,269,756	5.7	90,047,271	.....
	1950	94,747,849	90,841,000	96.7	66,400,000	9,137,146,720	752,647,018	732,012,816	8.0	79,533,238	.....
Percent change 1951 over 1950		+3.5	+8.9	+4.3	+6.9	+21.7	+59.6	−13.2	−28.7	+13.2	.....

1. Estimated, based on national operating rate.
2. Estimated.
3. National rate by AISI.
4. Revised.
5. Less cost of treasury stock.
6. Fiscal year ended June 30.
7. Includes shipments of purchased semi-finished.
8. 2-for-1 stock split Jan. 17, 1951.
9. Plus 5% stock div.

Financial Analysis of the Steel Industry

ən ral e	Net Income	Net Income Percent of Sales	Number of Common Shares Outstanding	Earnings Per Common Share	Common Dividends Declared	Number of Preferred Shares Outstanding	Preferred Dividends Declared	Funded Debt[12]	Preferred Stock	Commo Stock
00	184,359,787	5.2	26,109,756	6.10	78,329,268	3,602,811	25,219,677	54,879,636	360,281,100	870,325,
00	215,464,142	7.3	26,109,756	7.29	92,689,633	3,602,811	25,219,677	61,782,446	360,281,100	870,325,
00	106,531,293	5.9	9,582,942	10.43	38,331,768	933,887	6,539,209	220,314,000	93,388,700	303,459,
00	122,976,071	8.5	9,582,942	12.15	39,290,062	933,887	6,537,209	166,064,000	93,388,700	303,459,
00	54,921,541	5.2	5,896,719	9.03	23,586,812	282,043	1,692,258	141,209,110	28,204,300	135,979,
00	63,794,711	7.2	5,896,719	10.53	25,050,665	282,043	1,692,258	47,461,903	28,204,300	135,979,
00	30,998,000	5.5	6,200,654[8]	4.76	10,711,000	293,568	1,468,000	115,128,000	29,357,000	62,007,
00	39,744,000	8.2	2,600,327	14.72	7,148,000	293,568	1,468,000	71,771,000	29,357,000	103,937,
00	45,287,093	7.32	7,362,045	6.15	22,029,986	None	None	40,000,000	None	73,620,
00	57,814,974	10.77	7,362,045	7.85	20,917,690	None	None	40,000,000	None	73,620,
92	35,004,487	6.54	5,214,997	6.69	14,758,593	None	139,570	59,096,995	None	52,149,
28	47,000,505	10.70	3,954,333	11.76	15,701,546	182,344	880,609	60,920,000	18,234,400	39,543,
00	30,644,201	6.34	3,350,016	9.15	10,050,048	None	None	52,000,000	None	105,088,
00	40,616,403	10.05	3,350,016	12.12	10,050,048	None	None	28,500,000	None	105,088,
00	34,398,585	6.6	4,899,315	7.02	17,147,603	None	None	67,250,000	None	62,500,
00	38,015,676	8.2	4,899,315	7.76	17,147,603	None	None	69,250,000	None	62,500,
00	17,392,959	7.59	1,423,897	10.96	4,270,990	357,526	1,790,723	50,912,900	35,752,600	37,021,
00	18,314,517	9.81	1,423,897	11.59	2,776,235	361,436	1,813,755	38,812,000	36,143,600	37,021,
00	8,861,187	5.2	1,100,000	8.06	3,414,657	None	None	8,850,000	None	11,060,
00	9,284,643	6.8	925,863	10.03	2,854,743	None	None	8,500,000	None	9,319,
00	10,382,228	5.42	2,000,523	5.06	3,151,581	None	265,723	22,337,500	None	10,003,
00	4,406,226	3.91	1,191,096	3.30	1,752,341	428,495	477,127	14,437,500	8,587,929	5,955,
17	7,510,561	7.5	3,200,000	1.86	None	1,600,000	1,550,844	85,000,000	40,000,000	3,200,
00	11,940,593	14.1	1,000	None	None	None	None	92,139,523	None	100,
21	8,363,225	4.12	574,362	11.89	16% stk. div.	305,272	1,526,360	26,405,000	30,527,200	14,359,
23	6,311,254	4.27	488,680	9.73	None	310,574	1,941,087	22,345,000	31,057,400	12,216,
00	7,331,599	4.87	1,091,915	5.99	2% stk. div.	241,943	3,065,327	9,287,989	24,194,300	8,819,
00	6,350,410	5.33	931,048	6.13	None	120,265	781,831	5,513,908	12,026,500	7,044,
74	4,164,177	4.5	2,230,910	1.87	892,364	None	None	None	None	2,230,
42	1,474,226	2.8	2,223,402	.66	None	None	None	None	None	2,223,
40	8,834,140	3.86	1,627,169	5.40	4,067,920	81,346	42,958	22,170,000	8,134,600	10,169,
00	9,814,891	5.52	1,320,651	7.07	3,240,607	100,285	476,454	6,480,000	10,028,500	8,254,
00	5,142,520	5.9	1,278,462	4.02	2,656,014	102,265	None	12,003,125	10,226,500	15,980,
00	5,727,406	9.6	497,201	11.52	1,888,877	None	None	5,133,333	None	11,027,
00	3,549,367	4.4	317,976	11.16	1,271,904	None	None	1,955,000	None	3,179,
34	1,922,037	3.63	317,976	6.04	620,053	None	None	2,870,000	None	3,179,
29	10,514,896	.092	1,185,793	8.87	2,371,586	None	None	13,425,000	None	1,185,
70	8,943,140	.096	1,185,793	7.54	2,371,586	None	None	14,475,000	None	1,185,
00	2,303,720	3.9	594,107	3.32	820,573	65,250	329,062	4,982,000	6,525,000	5,941,
00	2,546,902	5.7	562,202	3.92	336,558[9]	67,500	340,908	5,617,000	6,750,000	5,622,
00	2,703,165	3.5	514,864	5.14	1,184,187	21,300	54,470	1,638,000	1,065,000	2,574,
50	2,572,539	4.6	514,864	4.88	1,029,728	22,830	58,033	1,710,000	1,141,500	2,574,
00	2,482,974	6.1	290,413	8.55	645,958+ 20% stk. div.	None	None	1,500,000	None	2,904,
00	2,150,170	6.9	193,676	11.10	387,352	None	None	3,000,000	None	1,936,
00	2,797,998	5.87	206,250	13.57	1,072,500	None	None	1,902,542	None	4,125,
00	3,222,475	8.13	206,250	15.62	1,113,750	None	None	2,042,313	None	4,125,
40	4,724,286	10.64	1,875,000	2.52	3,000,000	None	None	None	None	2,604,
21	6,477,387	14.99	1,875,000	3.45	3,843,750	None	None	None	None	2,604,
00	1,530,371	3.84	501,361	3.05	1,027,790	None	None	None	None	7,018,
00	2,660,153	7.30	501,361	5.31	1,654,491	None	None	None	None	7,018
00	2,915,271	6.8	817,825	3.56	None	None	None	None	None	4,089,
00	2,416,222	7.6	817,825	2.95	None	None	None	None	None	4,089,
..	1,619,925	6.81	600,000	2.70	600,000	None	None	None	None	10,574
..	51,143	0.45	600,000	0.09	None	None	None	None	None	10,574,
73	635,269,756	5.7	90,047,271	.....	245,393,102	7,887,211	43,282,181	1,012,246,797	671,656,300	1,822,171
18	732,012,816	8.0	79,533,238	.....	251,865,318	6,706,038	41,686,948	767,824,926	635,200,929	1,830,525
	−13.2	−28.7	+13.2	.....	−2.6	+17.6	+3.8	+31.8	+5.7	−4

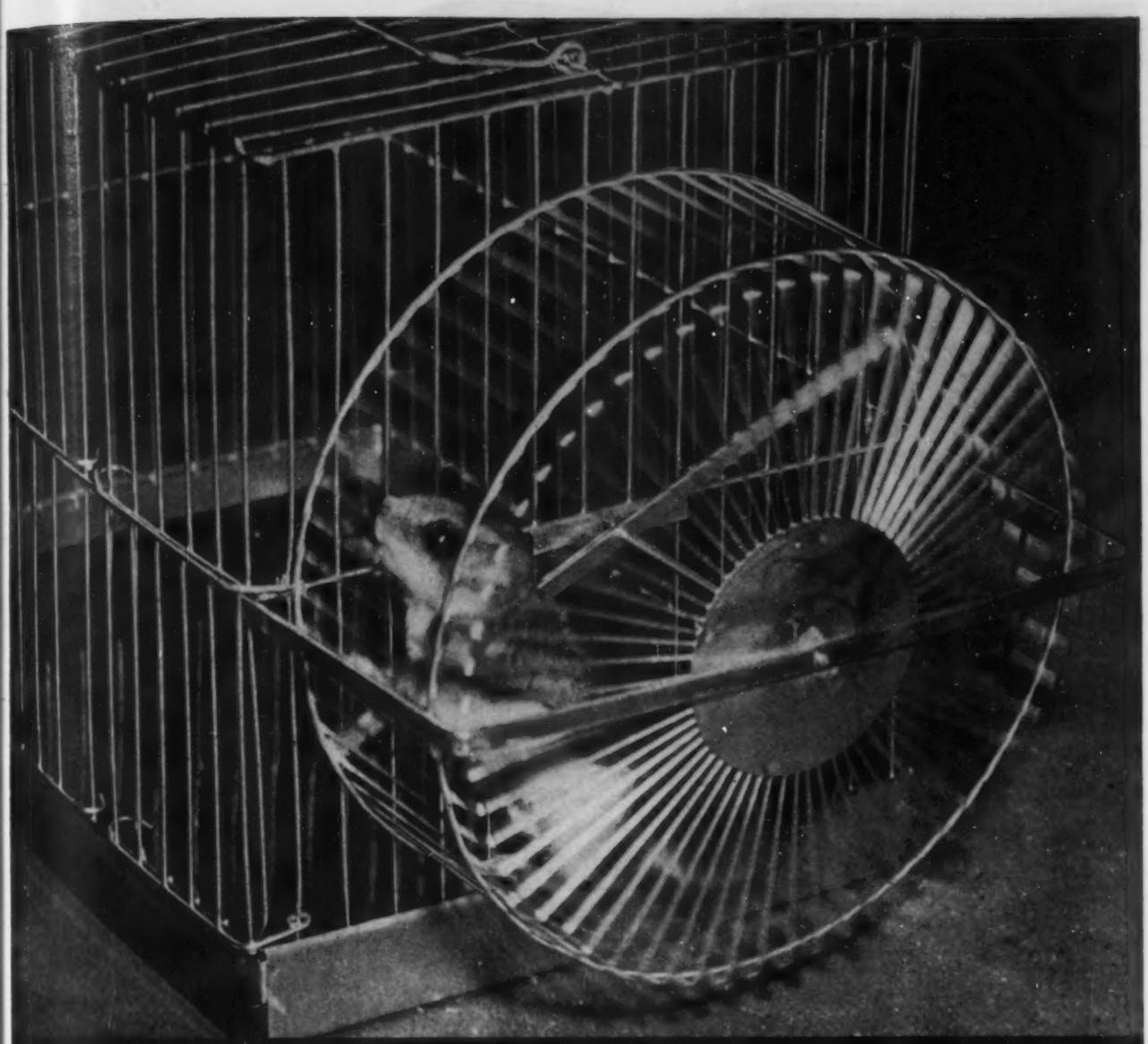
7. Includes shipments of purchased semi-finished.
8. 2-for-1 stock split Jan. 17, 1951.
9. Plus 5% stock div.
10. Add'l cap. not available till year-end.
11. Fiscal year ended July 31.
12. Payable after 1 yr.
13.
14.

istry, 1951-1950

DATA COVER OPERATIONS OF 27 COMPANIES REPRESENTING 90 PCT OF THE INGOT CAPACITY OF THE UNITED STATES AS OF JAN. 1, 1952

Common Stock	Surplus	Invested Capital	Working Capital	Capital per Ton of Ingot Capacity	Net Income Percent of Investment	Year	COMPANY
870,325,200	865,372,544	2,150,858,480	334,917,584	62.16	8.7	1951	U. S. Steel Corp.
870,325,200	784,561,702	2,076,950,448	441,818,453	61.27	10.4	1950	
303,459,830	476,763,402	1,093,925,932	464,368,175	69.34	10.3	1951	Bethlehem Steel Corp.
303,459,830	414,796,647	977,709,177	401,180,783	65.18	13.1	1950	
135,979,066	257,437,419	562,829,895	164,281,597	59.30	10.3	1951	Republic Steel Corp.
135,979,066	227,794,948	439,440,217	163,412,671	49.01	14.9	1950	
62,007,000	256,727,000	463,219,000	93,547,000	95.57	7.3	1951	Jones & Laughlin Steel Corp.
103,937,000	172,171,000	377,236,000	122,760,000	77.82[13]	11.0	1950	
73,620,450	241,365,705	354,558,375	158,825,552	71.63	.....	1951	National Steel Corp.
73,620,450	218,108,598	331,066,167	161,290,805	73.57	17.8	1950	
52,149,966	227,541,137	338,788,098	119,013,307	74.87	10.88	1951	Armco Steel Corp.
39,543,331	170,246,663	288,944,394	109,202,059	66.73	16.94	1950	
105,088,053	188,762,146	345,850,199	177,313,571	79.14	9.85	1951	Youngstown Sheet & Tube Co.
105,088,053	168,167,993	301,756,047	177,916,102	71.00	14.42	1950	
62,500,000	155,146,514	290,882,261	112,393,090	77.57	12.5	1951	Inland Steel Co.
62,500,000	137,895,532	275,631,279	127,736,143	74.01[13]	14.5	1950	
37,021,322	69,016,692	192,703,514	78,764,698	103.60	9.91	1951	Wheeling Steel Corp.
37,021,322	57,646,244	169,623,166	62,450,045	94.24	11.61	1950	
11,060,390	48,386,036	68,296,426	38,267,953	44.06	13.4	1951	Sharon Steel Corp.
9,319,020	37,827,943	55,646,963	32,008,323	38.61	17.2	1950	
10,003,216	64,541,572	96,882,288	30,222,674	63.63	11.36	1951	Colorado Fuel & Iron Corp.
5,955,480	53,402,257	82,383,166	28,991,963	55.97[13]	5.98	1950	
3,200,000	44,634,377	172,834,377	44,094,882	125.24	5.9	1951	Kaiser Steel Corp.
100,000	44,627,536	136,767,059	8,895,869	113.97	11.4	1950	
14,359,044	34,384,522	105,675,766	36,256,744	88.14	8.79	1951	Crucible Steel Co. of America
12,216,998	29,491,047	95,639,334	35,801,362	82.91	7.40	1950	
8,819,355	38,892,051	81,193,695	32,672,659	75.74	9.54	1951	Pittsburgh Steel Co.
7,044,845	34,468,851	59,054,104	24,581,146	55.09	11.22	1950	
2,230,910	16,114,783	18,345,693	6,957,425	20.54	22.7	1951	Barium Steel Corp.
2,223,402	12,810,741	15,034,143	4,873,158	16.84	9.8	1950	
10,169,806	54,936,367	73,240,773	35,187,010	89.62	12.06	1951	Allegheny Ludlum Steel
8,254,069	42,419,010	60,701,579	29,989,637	72.93	16.17	1950	Corp.
15,980,775	19,045,970	57,256,370	20,990,450	79.52	8.98	1951	Granite City Steel Co.
11,027,243	15,977,196	32,137,772	15,176,208	51.84	17.82	1950	
3,179,760	19,995,764	25,130,524	13,898,036	37.53	14.1	1951	Lukens Steel Co.
3,179,760	17,721,101	23,770,861	14,301,561	35.22	8.1	1950	
1,185,793	32,540,513	33,726,306	14,623,637	51.10	33.82	1951	Detroit Steel Corp.
1,185,793	24,397,203	25,582,996	14,882,754	38.76	36.46	1950	
5,941,070	12,033,917	29,481,987	4,740,432	47.17	9.1	1951	Alan Wood Steel Co.
5,622,020	10,679,808	28,668,828	5,855,838	52.13	10.1	1950	
2,574,320	14,780,729	18,420,049	9,612,770	33.25	14.3	1951	Copperweld Steel Co.
2,574,320	13,316,680	17,032,500	9,878,693	30.74[13]	13.9	1950	
2,904,130	9,514,963	13,919,093	3,992,315	32.75	18.3	1951	Rotary Electric Steel Co.
1,936,760	6,919,348	10,856,108	2,293,936	25.54	20.8	1950	
4,125,000	10,265,156	16,926,698	7,114,123	39.74	17.57	1951	Laclede Steel Co.
4,125,000	8,539,658	14,706,971	7,142,287	36.97	22.38	1950	
2,604,167	18,336,154	20,940,321	7,094,819	52.35	22.56	1951	Keystone Steel & Wire Co.
2,604,167	16,611,868	19,216,035	7,240,870	59.13	33.71	1950	
7,018,789[14]	9,467,646	16,486,435	5,326,017	41.84	9.3	1951	Continental Steel Corp.
7,018,789	8,965,065	15,983,854	5,407,788	40.59	16.5	1950	
4,089,125	8,261,712	12,350,837	56,205	38.48	23.6	1951	Northwestern Steel & Wire
4,089,125	5,088,273	9,177,398	3,448,604	28.59	26.3	1950	Co.
10,574,621	6,772,076	17,346,697	10,380,722	.....	9.34	1951	The Midvale Co.
10,574,621	5,751,568	16,326,189	9,862,083	.....	0.31	1950	
1,822,171,158	3,201,036,887	6,671,436,089	2,024,913,427	63.57	9.5	1951	GRAND TOTAL
1,830,525,664	2,741,404,480	5,958,063,263	2,028,399,141	55.84	12.3	1950	
−4.6	+16.8	+12.0	−1.7	+13.8	−22.8		Percent change 1951 over 1950

13. Approximate.
14. Included first time, affecting 1950 totals.



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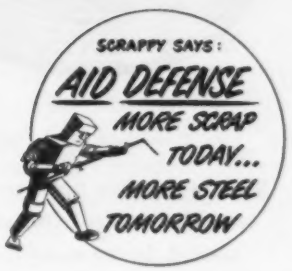

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UNITED STATES STEEL COMPANY

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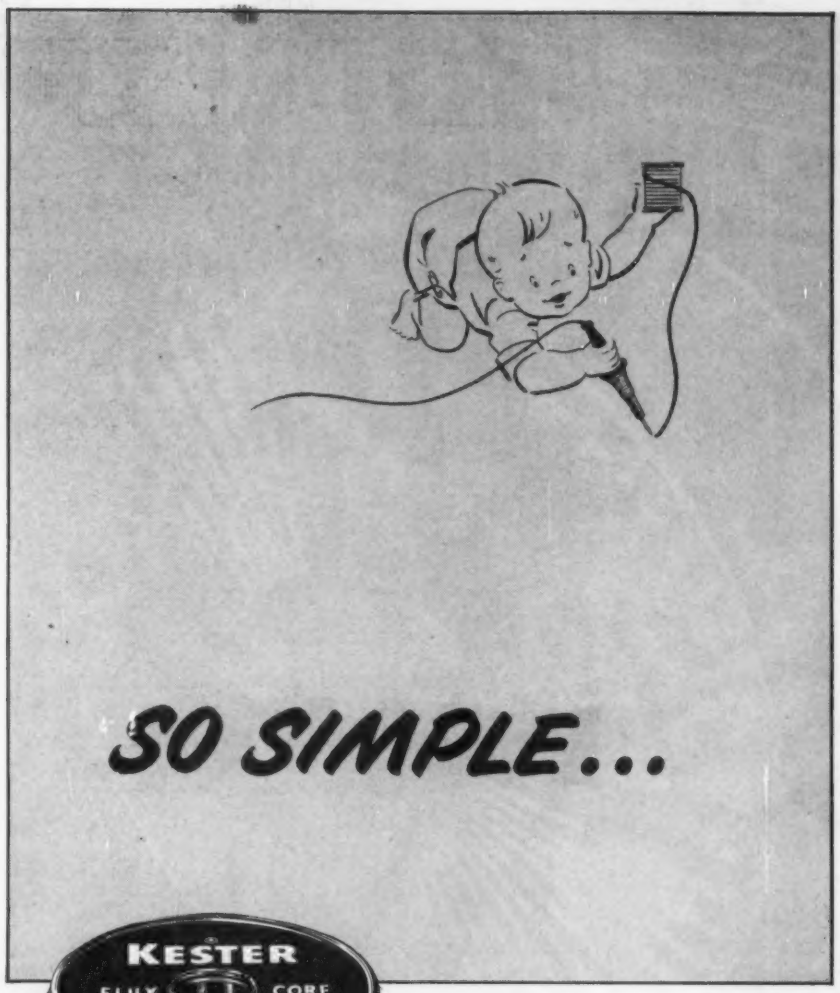

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SO SIMPLE to leave your soldering troubles to Kester

Kester alone can provide that *engineered* Flux-Core Solder so essential to efficient operation.

This is possible because only Kester possesses that necessary flexibility of flux control (different core sizes), just the right amount of flux needed, in the many diameters that range from .009″ to ¼-inch.

Technical Laboratories and Field Engineering Service adapt these features to specific requirements.

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KESTER SOLDER

Exemptions from OPS Form 128

Manufacturers of industrial valves, and heating, plumbing, and refrigeration equipment have been exempted by Office of Price Stabilization from using OPS Form 128 in reporting new ceiling prices for products not sold between July 1, 1949, and June 24, 1950.

OPS ruled that Form 128, which is required in fixing new ceiling prices under Ceiling Price Reg. 22, is neither appropriate nor convenient for manufacturers of these products. (Amdt. 43, CPR 22, effective Apr. 5.)

Shippers May Ask Rate Hikes

Individual contract water carriers now have authority to apply to government price-setters for adjustment of ceiling rates to compensate for higher operating costs.

Supplementary Reg. 91 to the General Ceiling Price Reg., effective Apr. 8, provides that carriers can apply to Office of Price Stabilization, listing facts to show they are caught in a cost-price squeeze and asking relief. The agency expects both river and intracoastal companies to utilize SR 19.

Electron Tube Materials Ample

Control officials say there will be enough materials available for the rest of the year to meet requirements for radio, television, and other types of receiving tubes.

Civilian requirements for receiving tubes this year are estimated at about 310 million, slightly less than 1951, including 6 million picture tubes for television sets.

Carbon Black Export Quotas Lifted

Exports of furnace carbon black will hereafter be licensed on an open-end basis, without quota restrictions.

Shipments abroad reached a new high of 433,000,000 lb last year, even under restrictions. It is estimated that with new production coming in, no further quotas will be necessary.

Steel Drum Inventories Raised

Inventory ceilings on steel shipping drums were raised last week to a 60-day level. However, packers may continue customary carload or truckload purchases if delivery is not accepted until inventories are less than a 45-day supply.

Supplies of steel drums and pails as well as metal cans are just about in balance with demand, according to National Production Authority, which predicts that all requirements will be met for the remainder of 1952.

Both the increased supply of raw materials and the stretch-out of the defense program were major factors in improving supply.

Issue Light Steel Plate Curbs

Under a new limitation order (Dir. 5 to M-1), on and after July 1, orders for light gage carbon steel plate may be placed with or accepted by wide plate mills only with express approval of National Production Authority.

Officials said the order was necessary to reserve the capacity of wide plate (160-in. or more) mills for production of heavy plate. It is estimated that capacity for heavy plate production will thus be increased by from 50,000 to 75,000 tons per quarter.

Limitation does not apply to stainless steel, full alloyed plate, plate for pipe, armor plate, circles for heads, or conversion plate products.

Latest Government Appointments

Washington has recently announced the following appointments:

J. Stokes Carswell, acting director, General Industrial Equipment Div., NPA;

Walter J. Currie, assistant administrator for civilian requirements, NPA;

Fred W. Fraley, deputy director, Chemical Div., NPA;

B. Bernard Greidinger, member, Renegotiation Board.

Dr. George E. Holbrook, deputy director, Chemical Div., NPA;

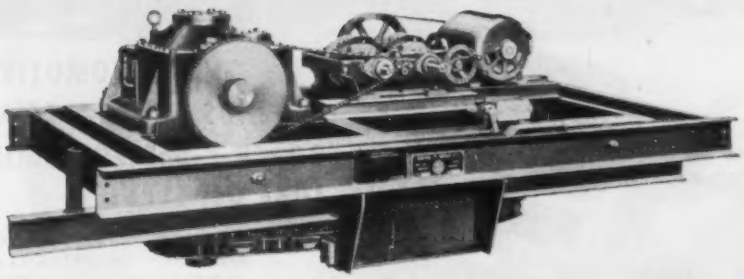
The FIRST Flying Carpet

was "FLOATED" by an Old Caliph in Bagdad

He mentioned it frequently in his famous Tales of the "Thousand and One Nights." Since then "air space" has been put into use for many mechanical devices . . .

Not a floating carpet — but a powerful pulling "work-horse" for conveyor systems is the

FLOATING DRIVE with AUTOMATIC CUT-OFF and LOAD INDICATOR



another FIRST by JERVIS B. WEBB COMPANY

For years a standard on Webb Conveyor systems, the patented Floating Caterpillar Drive enables automatic limit switch cut-off in case of jam, cushions starting load, and has an easily seen calibrated load indicator.

The motivating power unit on both the Caterpillar and Sprocket type Webb drives floats on wheels against heavy springs. When a conveyor starts, the initial shock is taken by these springs.

If external forces jam the conveyor, the springs are compressed to a point where the moving frame actuates a limit switch on the fixed frame, stopping the drive instantaneously. As soon as the jam is eliminated, the conveyor may be started immediately by push button. There are no shear pin headaches. If a conveyor becomes overloaded, this fact is indicated at once as the compressor springs move an arrow indicator to a red danger area.

CONVEYOR ENGINEERS AND MANUFACTURERS

JERVIS B. WEBB COMPANY

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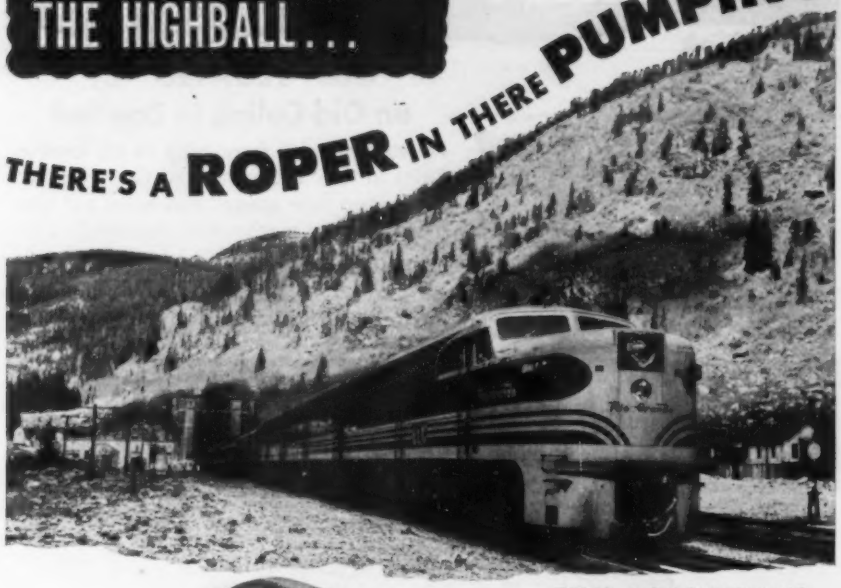
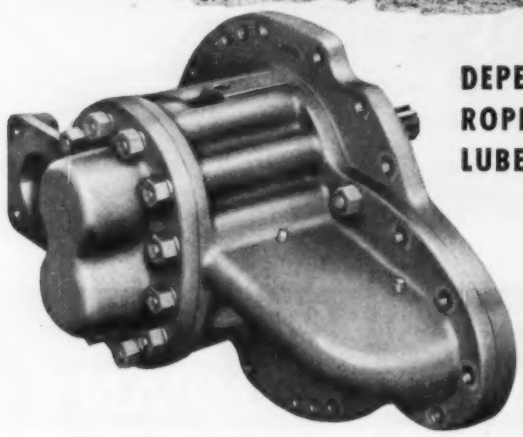
WHEN THEY GIVE 'ER THE HIGHBALL...

THERE'S A ROPER IN THERE PUMPING





THIS LOCOMOTIVE DEPENDS ON A SPECIAL ROPER PUMP FOR MAIN LUBE OIL SERVICE

"A heavy duty pump for main lube oil service . . . compactness . . . rugged from shaft to ports" — that's generally what the specifications called for. So, we tackled the job and developed this special "tough service" pump for diesel engines such as the ones used in the Rio Grande "Prospector".

SPECIAL AND STANDARD MODELS FOR YOUR APPLICATION

This custom built lube oil pump for diesel applications operating at 1160 r.p.m. delivers 267 g.p.m. at 90 p.s.i. Although of special design, it employs the basic Roper principle — only 2 moving parts. In addition to special applications, there are Roper standard pumps of varied size and design which may be adapted to your needs. These include: SERIES 3600: pressures to 60 p.s.i. — 40 to 300 g.p.m.; SERIES F: 300 p.s.i. — 1 to 300 g.p.m.; SERIES H: 1000 p.s.i. — 5 to 75 g.p.m., and SERIES K: 150 p.s.i. — 3/4 to 50 g.p.m. For more detailed specifications on these dependable pumps, write for your catalog today.

ROPER Rotary Pumps

SEE OUR CATALOG IN SWEET'S

GEO. D. ROPER CORP.
104 Blackhawk Park Ave.
ROCKFORD, ILLINOIS

X-Ray for Pipe:

Gages determine crop point of seamless steel pipe, check walls.

X-ray operated pipe wall thickness gages recently installed at the Ambridge Plant of Spang-Chalfant Div., National Supply Co., are proving satisfactory in determining the crop point of seamless steel pipe. The gages check wall thicknesses ranging from .050 in. to 1.500 in. within accuracy of 1 pct. They can be used to check pipe with inside diameters of 3 in. or larger; smaller diameters may be checked by using specially designed probes.

The gages are located immediatly beyond the roll straightener. Pipe coming from the straightener is conveyed to a stop aligned with the first X-ray gage and is automatically kicked out onto skids. Manually controlled jack-rolls pick up and rotate the pipe at 60 to 120 rpm.

Equipment consists basically of an X-ray generator, enclosed in ray-proof, shock-proof housing, and a pick-up unit mounted in a probe tube. Both are mounted on a hydraulically operated, manually controlled buggy that is closely aligned with the jack-rolls.

Paint Indicator—The generator radiates an X-ray beam approximately 3/8 in. in diam. through the steel wall of the pipe. As the probe tube is passed into the open end of the pipe, the pick-up unit receives the X-ray beam and converts it into an electrical signal. This is amplified to actuate an indicating meter and automatic servomechanism. This mechanism sprays paint on the outside of the pipe at any point where the wall thickness is less than the predetermined standard for which the instrument has been calibrated.

After the wall thickness is checked on one end, the pipe is conveyed to another X-ray gage at the opposite end of the skids, and the second end is checked in a similar manner.

The forward speed of the buggy

is such that the pipe can be checked at the rate of two inches or more of length per second. The probe length is designed to check each pipe end to a maximum length of 5 ft.

The first experimental X-ray

gage of this type ever used for checking wall thickness of seamless steel pipe was installed in the Ambridge Plant of Spang-Chalfant in 1950. During the latter part of 1951, additional X-ray gages were installed in the line of production. All of these gages were designed and manufactured by the Industrial Gauges Corporation of Englewood, N. J., who also assisted in developing the method of application and the auxiliary equipment.

Ark. Titanium Ore Test Results

Bureau of Mines laboratory tests on titanium ore samples from the Christy deposit in Hot Spring County, Ark., have yielded concentrates containing 91 to over 92 pct titanium oxide.

Ore contains about 6 pct TiO_2, chiefly in the form of brookite. Some vanadium is also present.

Joint Titanium Research Planned

Glidden Co., Cleveland, and Bohn Aluminum & Brass Corp., Detroit, have signed an agreement for a joint titanium research program. It will be conducted on a 50-50 basis, with expenses and information shared equally.

If you buy Cutting Tools

Are you responsible for purchase or specification of cutting tools —or wear and abrasion-resistant parts? You'll find the *Gorham* Tool Catalog a *helpful time saver!* 120 pages, packed with useful information, describe and illustrate the complete *Gorham* line—*PLUS* an informative section of Engineering Data. Request your free copy on company letterhead.

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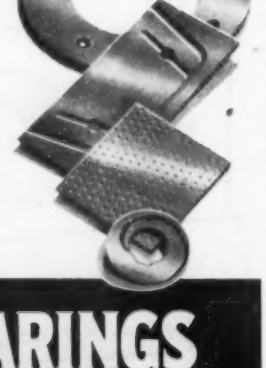
Bronze on Steel BEARINGS

FOR INDUSTRIAL USES

THEY ARE LIGHT IN WEIGHT and low in cost, have been widely used in automotive and farm equipment, and have certain important industrial uses. They are Bronze-on-Steel (copper-lead) Bearings—precast bearing bronze powder bonded to copper coated strip steel—modern type sleeve bearings developed and patented by Johnson Bronze. They combine the fine bearing qualities of copper-lead alloy with the strength and other physical properties of the steel backing. Johnson engineers will gladly study any proposed application and help you determine whether you can use Johnson Bronze-on-Steel Bearings. Write today.

Ideal for washers, thrust plates and other flat parts requiring a bearing surface.



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Sleeve Bearing Headquarters Since 1901

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Defense Contracts

Government Inviting Bids

Latest proposed Federal procurements, listed by item, quantity, invitation No. or proposal and opening date. (Invitations for Bid numbers are followed by "B", requests for proposals or quotations by "Q".)

Ammunition Center, St. Louis.
Ctg ball revolver cal .38, 455,000, 23-196-52-5B, Apr. 29.
Ctg ball cal .30, 215,000, 23-196-52-5B, Apr. 29.
Ctg ball auto cal .45, 235000, 23-196-52-5B, Apr. 29.
Shell shotgun 12 ga nr 2 C.S., 145,000, 23-196-52-5B, Apr. 29.

Corps of Engineers, St. Louis.
Screw, cap, steel, 547170 ea, ENG-23-065-52-711B, Apr. 17.

Contracting Office, West Point, N. Y.
Container, pressure, 320 ea, 52-430C-B, Apr. 16.
Container, fuel, 320 ea.

Rock Island Arsenal, Rock Island, Ill.
Bracket & bushing assy, 800 ea, 11-070-52-799B, Apr. 21.
Cover pump oil welded assy, 1210 ea, 11-070-52-805B, Apr. 21.
Chuck drill, 1715 ea, 11-070-52-813B, Apr. 21.
Sight relecting assy, 50000 ea, 11-070-52-816B, Apr. 22.
Shoe & lining assy, 500 ea, 11-070-52-817B, Apr. 25.

Naval Supply Depot, Mechanicsburg, Pa.
Wrenches engineers, 8512 ea, 72-23308B, Apr. 24.

Ordnance Tank Automotive Center, Detroit.
Tappet valve, 21000, 52-2827B, Apr. 24.
Filter oil, 14175, 52-2837B, Apr. 24.
Pin dowel rear bearing cap, 1000, 52-2774B, Apr. 24.
Shaft w/weight plate, 1000
Spark plug assy, 871000.
Brkt adj eng gen reg, 15000, 52-2781B.

Frankford Arsenal, Philadelphia.
Spare parts for setter fuze, 8000 ea, Ord-52-780, Apr. 23.
Spare parts for MT telescope and pan tel, 2500 ea, Ord-52-783, Apr. 23.
Spare parts for mount sight M 86, var 3 itms, Ord-52-784, Apr. 23.
Disc cartridge case brass, 4730 ea, Ord-52-795, Apr. 11.

Detroit Arsenal, Centerline, Mich.
Ball, shackle bearing, 8782 ea, 52-261B, Apr. 23.
Lock, finished machined, 75010, 52-261B, Apr. 23.
Mount assy, AA Cal. machine gun, 5949 ea, 52-265B, May 12.

Navy Purchasing Office, Washington.
Pliers combination ignition, 22200, 6451B, Apr. 14.

Watervliet Arsenal, Watervliet, New York.
Steel crank firing assy assembled part for 40MM guns, 2300 ea, 52-2131B, Apr. 24.
Steel bracket assemblies assembled part for 40MM gun, 1500 ea, 52-131B, Apr. 24.
Steel intermediate spindle assemblies assembled part for 40MM gun, 350 ea, 52-131B, Apr. 24.
Steel detent part for 90MM gun, 2500 ea, 52-136B, Apr. 25.
Pin part for 20MM gun, 15400 ea, 52-136B, Apr. 25.
Guide part for 20MM gun, 15400 ea, 52-136B, Apr. 25.
Steel detent part for 90MM gun, 2500 ea, 52-136B, Apr. 25.
Pin part for 20MM gun, 15400 ea, 52-136B, Apr. 25.
Guide part for 20MM gun, 15400 ea, 52-136B, Apr. 25.

Springfield Armory, Springfield, Mass.
Pin, back plate latch, 29903 ea, 52-230B, Apr. 10.
Pin, belt feed pwl, 37379 ea.
Pin belt holding pawl assy, 79358 ea.
Pin, buffer piston, 41980 ea.
Pin, lock barrel extension shank, 38604 ea.
Spring driving inner with spring driving outer group, 65354 ea, 52-226B, Apr. 9.
Spring firing pin drg, 42555 ea, 52-226B.
Spring cover detent pawl, 33066 ea, 52-226B.
Plunger adjusting screw, 58656 ea, 52-227B,

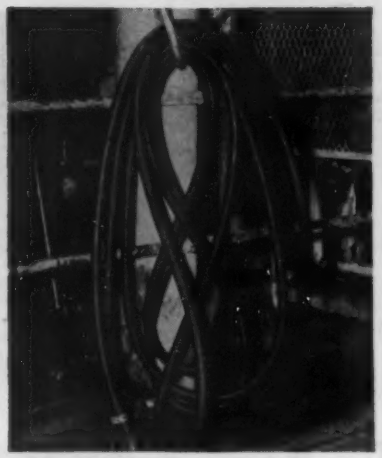
Stop back plte latch lock spring, 44280 ea, 52-227B.
Stop bolt, 28753 ea, 52-227B.
Stud bolt, 48017 ea, 52-227B.
Stud link chute adapter, 58528 ea, 52-227B.
Washer belt feed lever pivot stud, 37262 ea, 52-227B.
Washer cove latch shaft, 9484 ea, 52-227B.
Plate recoil dwg, C5557150, 400000 ea, 52-235B, Apr. 14.
Liner hand guard, 400000 ea, 52-235B, Apr. 14.
Rivet hand guard liner, 1319100 ea, 52-235B, Apr. 14.
Escutcheon recoil plate screw, 400000 ea, 52-235B, Apr. 14.
Screw recoil plate, 400000 ea, 52-235B, Apr. 14.

Contracts Reported Last Week

Including description, quantity, dollar value, contractor and address:

Push buttons and controllers, 1640, $207,786, Ward-Leonard Electric Co., Mt. Vernon, N. Y.
Thimbles cable assy, 30000, $27,600, Shield Mfg. Co., Wheeling, Ill.
Engine assy, 400 ea, $926,972, Hercules Motors Corp., Canton, Ohio.
Aircraft hardware, $112,600, Westinghouse Electric Corp., Dayton.
Indicators, 1775 ea, $200,000, Kollsman Instrument Corp., Elmhurst, N. Y.
Indicator, 10098 ea, $653,799, Bendix Aviation Corp., Teterboro, N. J.
Indicator, 818 ea, $140,155, Bendix Aviation Corp., Teterboro, N. J.
Milling machines, 21 ea, $346,212, Cincinnati Milling & Grinding Machines, Inc., Cincinnati.
Power package build-up equipt, $109,000, Rohr Aircraft Corp., Chula Vista, Calif.
Bushing, barrel, 120000 ea, $78,000, Waltham Screw Co., Waltham, Mass.
Gun parts, exceeds $250,000, Colt's Mfg. Co., Hartford.
Tank, dipping electrically heated, 108- ea, $68,055, Aeroil Products, S. Hackensack, N. J.
Wrenches, adjustable, 65,595, $83,688, Plomb Tool Co., Los Angeles.
Wrenches, pipe, 3300, $27,885, The Erie Tool Works, Erie, Pa.
Pliers, adjustable, 31396, $53,373, Utica Drop Forge & Tool Corp., Utica, N. Y.
Pullers, bearing & gear, 287 sets, $25,296, Armstrong-Bray & Co., Chicago.
Hardware kit, 4500 ea, $40,387, Cooper & Fitton, Philadelphia.
Radio set, 490 ea, $588,000, Motorola, Inc., Chicago.
Radio set, 394 ea, $473,800, Motorola, Inc., Chicago.
Battery, dry, 40,560, $108,016, General Dry Batteries, Inc., Lakewood, Ohio.
Gasoline engine maintenance parts, 828 ea, $2,912,543, O'Keefe & Merritt Co., Los Angeles.
Transformers, 19212 ea, $65,001, Carron Mfg. Co., Chicago.
Power supply, 2130 ea, $880,772, Admiral Corp., Chicago.
Multimeter, 6300 ea, $358,309, Caroled Co., Inc., New York.
Reperforator transmitter, 580 ea, $773,617, Teletype Corp., Chicago.
Radio interference measuring set, 2 ea, $198,687, Empire Devices, Inc., Bayside, N. Y.
Recorder, code, 243 ea, $151,248, McElroy Mfg. Corp., Littleton, Mass.
Repair parts for diesel engines, 1598, $25,321, The Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Repair parts for refrigeration equipt, 8646, $34,544, Carrier Corp., Syracuse, N. Y.
Repair parts for galley equipt, 5813, $87,752, The Insinger Machine Co., Philadelphia.
Repair parts for gyro compasses, 9383, $47,609, Sperry Corp., Great Neck, N. Y.
Automatic regulators and repair parts, 15227, $95,056, Grove Controls, Inc., Emeryville, Calif.
Temperature regulators & repair parts, 24746, $350,925, Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Repair parts for rotary & centrifugal pumps, 20025, $1,104,151, Dravo Corp., Philadelphia.
Repair parts for ships telephone systems, 19162, $45,200, Automatic Elec. Sales Corp., Chicago.
Repair parts for pumps, 9427, $56,137, Warren Steam Pump Co., Warren, Mass.
Valves & repair parts, 6140, $38,613, Kunkle Valve Co., Fort Wayne, Ind.
Maintenance parts, exceeds $250,000, Bendix Aviation Corp., South Bend, Ind.
Replenishment of tools, 450 ea, $122,805, The Black & Decker Mfg. Co., Towson, Maryland.
Replenishment of hardware, 124000 ea, $98,891, The Timken Roller Bearing, Canton, Ohio.
Replenishment of hardware, 283407 lbs, 3429 ea, $181,749, Revere Copper Brass Inc., Detroit.

HEWITT-ROBINS



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NOW YOU CAN FIGURE YOUR OWN REPLACEMENT CONVEYOR BELTING SPECIFICATIONS

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For the first time you, yourself, can accurately determine the correct specifications of conveyor belting needed to meet the service conditions in your plant.

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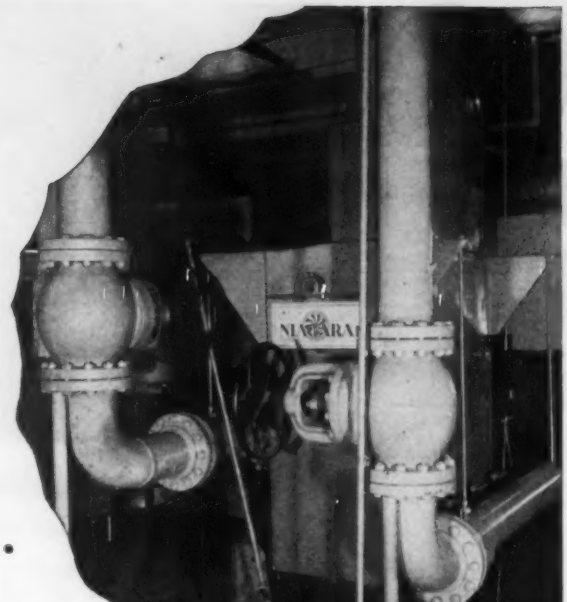
How to get drier or cooler gases . . .



NIAGARA AERO AFTER COOLER cools a compressed gas, or air, below the temperature of the surrounding atmosphere, thus preventing the condensation of moisture in your lines. The gas will contain only half of the moisture left in it by conventional methods. Even drier gas can be produced if you require it.

In working with controlled atmospheres of inert gases to prevent undesired reactions, this dryness of the gas at low cost is a great advantage. The cost of the Niagara method is low because it uses evaporative cooling, saving 95% of the cost of cooling water (and its piping and pumping). This direct saving of cost pays for the Niagara cooler in less than two years.

If you use compressed air to operate tools or pneumatic equipment you save much in water and oil damage to tools and equipment, and in water damage to materials by using the Niagara Aero After Cooler.

Write for a bulletin, or ask nearest Niagara Field Engineer if you have a problem involving the industrial use of air.

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Over 35 Years' Service in Industrial Air Engineering

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Ships:

Lloyd's endorses Admiralty approval of welded construction.

Lloyd's Register of Shipping has found welding "entirely vindicated" as a method of ship construction, endorsing the view of the British Admiralty Ship Welding Committee. In making the statement, Lloyd's said that with proper attention to design, workmanship and materials, it "looks forward confidently to continued advances through the adoption of welding."

Structural failures in a few welded ships in heavy weather this winter had raised some doubts as to the reliability of welded construction. Lloyd's points out that these failures were almost all among World War II type ships, which were turned out by the hundreds, particularly in the United States.

This immense production achievement was made possible only by widespread adoption of welding. Failures in a few of these ships must be related to the very large number delivered—about 2600 Liberty ships and some 530 tankers of the type involved in the February casualties.

Since the war Lloyd's Register has surveyed during building many hundreds of predominantly welded ships. Incorporating the results of experience and research, these ships are giving full satisfaction in service. To date major failures have not occurred in welded ships built since 1945.

More Use—A considerable increase in the use of welding in shipbuilding has taken place in British yards since the war. This is particularly true of bigger shipbuilders, many of whom are doing as much welding as they can. In smaller yards, which cannot afford the high costs of reorganization of layout and equipment, riveting is still predominant.

Main advantage of welding is its convenience. In itself a costly process, and often without any direct saving in labour, welding permits large sections to be fabricated under cover.

"Define Distress Contracts—Or Else"

Navy refuses to follow "distress area" policy of awarding defense work unless it gets concrete assurances . . . High price contracts mean less items, Navy claims—*By G. H. Baker.*

One current federal procurement tangle resulting from the government's failure to define the conditions under which defense contracts may be awarded in unemployment areas is fast headed for a showdown.

Basic alternatives confronting all federal agencies involved in the letting of defense contracts: Either clearly define the "distress area" policy, or cancel it.

At least one big buying agency —Navy—has flatly declared that it has no intention of following the "distress area" policy unless it has clear-cut assurance from the General Accounting Office of the firm legality of awarding contracts to companies which are not low bidders.

Put It in Writing—Navy's position, as expressed by Vice Admiral Charles W. Fox, chief of naval material: "Before I will authorize procurement officers to pay additional prices, I want the green light from this [House Appropriations] committee, and from the Senate [Appropriations] subcommittee.

Fox says flatly that he is unwilling to direct his procurement officers to make these (distress area) procurements at higher prices unless Congress "assures us that it is all right."

Less for the Money—"I consider that we have no such green light from the Comptroller General," Fox declares. "We, as the procurement officers, are placed in a very precarious position of again trying to conform to the basic principles of getting the most for the taxpayer's dollar.

"And we feel that if we carry out these directives, we are going to get less end-items, or we are going to have to come back to you for more money to get the items that we need."

Coal for Aluminum — National Security Resources Board, carrying out its role of observer and planner for the long-range basic needs of U. S. industry, is taking new interest in the commercial possibilities of coal-fired power plants for aluminum production.

Edwart T. Dickinson, NSRB vice-chairman, discloses that Sam Anderson, the government's aluminum planner, has asked NSRB "to look ahead, for example, at the Ohio coal fields."

As Dickinson puts it: "We are running out of hydroelectric energy to convert aluminum in this country, and he [Anderson] asked me particularly to make a study of the long-range capacity of the low-cost thermal units—power units—in the Ohio coal fields, so that we can develop new turbo-generators that will produce power at 2 mills."

"Copper!"

Industry's Problem — But current research into the economics of coal-fired plants is almost entirely an industry problem. The government's role is simply one of "watchful waiting." And a patent filed in Washington by Consolidated Coal Co., of Pittsburgh, is of particular interest to NSRB these days.

Consolidated's engineers estimate a conversion factor of 80 pct —a remarkably high efficiency factor when it is considered that a 30 pct conversion factor is common in many aluminum power plants.

Oil Expands—Oil industry expansion plans (90,000 new wells in the 18-month period starting July 1) approved last week by Defense Production Administration are going to require a total of more than 10 million tons of steel for new construction, maintenance, and repair.

Of this tonnage, 3,435,240 tons are to be allocated for use in the last 6 months of this year, and another 6,798,635 tons for use in 1953. These figures do not include tonnages for the gas industry. Petroleum Administration for Defense is planning a separate allocation program for new gas lines and maintenance.

All It Can Use?—Present government goal calls for drilling of 80,000 new domestic wells and 10,000 new foreign wells. Estimated cost of the over-all expansion program: $10 billion. And officials predict that the industry actually will be able to get all the materials it can use, despite the seemingly restrictive allocation tonnages.

PAD believes that the steel plate situation will ease considerably early next year, and that pipe output also will rise, although to a lesser degree.

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BUILDING: Record Year Expected

Capital outlays for new construction at $6.4 billion at end of March . . . Easing of controls, supplies should topple 1951 record . . . Industry's share is largest — *By A. K. Rannells.*

Indications now are that the nation is off this year to new heights in construction activity—despite restrictions, materials shortages, and other obstacles which hampered first-quarter activity.

Capital outlays for new construction continued at record levels over the period, standing at $6.4 billion at the end of March, or slightly above the figure for the first quarter of 1951.

With easing of restrictions and supplies in sight, and promises by production agencies of greater quantities of materials for the last half—especially in the commercial field—it would now look as if last year's record would be toppled. But no one will guess by how much.

Largest—Upholding high volume so far this year has been industrial construction, sparked by the expansion program which will continue over a considerable period. Close to $625 million has gone into industrial-type building since the first of the year.

This figure is 50 pct more than for the same quarter of 1951. It has more than offset the one-third decline in store, office, and other commercial building which fell from last year's figure of $375 million to $235 million.

Military expenditures for the first quarter were listed at $375 million as compared with less than $100 million last year. This high level will also continue.

More Homes—Probably the biggest surprise has been the upswing in homebuilding. Governmental restrictions were promulgated on a basis of allowing construction of 650,000 units—and hoping that the total could be held to 800,000.

A more optimistic outlook for materials and other factors caused 25 pct jump in new permits and starts during March.

Preliminary figures indicated that the March total would amount to 100,000 new starts, bringing the first-quarter total to almost 250,000 family units.

Over 1 Million—Starting into the construction season with this as a base, it would appear that the 1952 total might reasonably be expected to pass the 1 million mark.

Supporting this position is the increase in public housing starts which amounted to 12,000 in March—a sharp increase. Plans are for a minimum of 50,000 of this type this year.

Highway construction for the quarter was 20 pct below last year. But expenditures during March jumped sharply over February.

Renegotiation:

Revisions to rules promise break to plant that uses subcontractors.

A little more incentive has been given prime contractors to share defense work with smaller subcontractors through a promise of "favorable treatment" when the prime meets up with the U. S. Renegotiation Board.

Revisions to Renegotiation Board regulations, which adjust profits on government contracts, state that a firm "will be given favorable treatment when it has demonstrated its efficiency and ingenuity in finding appropriate opportunities for subcontracting . . ."

The new revisions underscore that added administrative costs incurred in subcontracting will be considered during contract renegotiations. (They probably would have been considered, anyway.) Small Defense Plants Administration has taken this as a cue to alert its field offices to the advantages prime contractors can reap through subcontracting.

SDPA expects that the revisions will put more steam in subcontracting by encouraging big producers to share the work. However, other small business proponents say that although this is a step in the right direction, the "favorable treatment" clause is but a superficial attack on the overall problem. (See p. 91 for story of Navy's rebellion against "high" bid contracts.)

"Washington says it's definitely rush, but hold production because they may cancel."

Law Revision Deadline Extended

U. S. Labor Dept. has extended to June 10 the deadline for the filing of views on proposed revisions to Walsh-Healy (public contracts) Act regulations.

Revision is necessary, the government says, to spell out more specifically responsibilities of primary and secondary contractors in complying with requirements of the law.

Reports Filing Deadline Extended

U. S. Renegotiation Board has postponed until May 1 the deadline for filing the financial reports required of defense contractors for 1951. Extension was authorized, the board says, because many contractors did not know reports were necessary.

Industrial Briefs

New Distributors—To increase the availability of aluminum and give better service to small users, REYNOLDS METALS CO., Louisville, has appointed three new distributors. Two of these, Vinson Supply Co., Dallas, and Vory's Bros., Inc., Columbus, Ohio, will handle the general line of Reynolds Aluminum Mill Products, and the third, G. A. Avril Smelting Corp., Cincinnati, is for the distribution of ingot products only.

Sales Office Opens—STERLING ELECTRIC MOTORS, INC., Los Angeles, has opened a new sales office in Buffalo at 63 Liston Road. The new office will be under the administrative direction of Dean Paul, and J. W. Byrnes has been appointed manager.

Parker Distributor—Parker tube fittings, tube fabricating tools and related power plant accessories, will be distributed by J. N. FAUVER CO., newly established at 1534 Keystone Ave., Dayton. This new distributor, under the direction of K. H. Miller, is a branch operation of the Fauver Co. of Detroit.

Industrial Fuels Institute—In cooperation with fuels consultants and equipment manufacturers, UNIVERSITY OF WISCONSIN is planning an institute on industrial fuels combustion to be held in Madison, May 13-15. It will consider problems involved in the efficient burning of coal, oil, and gas. Other phases to be discussed are fuel characteristics, economical selection and application of fuels, combustion analysis and control, and the utilization of waste and by-product fuels.

Improved line—INTERSTATE DROP FORGE CO., Milwaukee, has introduced an improved line of bolt cutters, strap shears, hot line wire cutters and sheet metal hand tools. Interstate recently acquired the tool line of the Helwig Mfg. Co., St. Paul, which is now reappearing with heat-treated, drop-forged handles, plates and jaws.

Correction—Our apologies to MORRISON INDUSTRIES, Bedford, Ohio, for calling their new furnaces Top-Fried. This should have read Top-Fired.

Minnesota Distributor—KOEHRING CO., Milwaukee, has appointed Ruffridge-Johnson Equipment Co. as Minnesota distributor, to handle the complete line of Koehring heavy duty construction equipment. C. T. Johnson is president and sales manager, and L. C. Buffridge is vice-president. Ruffridge-Johnson is located at 250 Tenth Ave., S. Minneapolis.

Refrigerator Cars—St. Louis Refrigerator Co. has ordered 200 steel sheath 40-ton, 40-ft refrigerator cars from PRESSED STEEL CAR CO., New York. In addition, 100 sets of car parts for the same type cars have been ordered for construction in the company's own shops.

Companies Merge — RYAN AERONAUTICAL CO. and CALIFORNIA METAL ENAMELING CO. have combined their activities in production and testing of ceramic coated parts for high-temperature aircraft applications. The new arrangement combines Ryan leadership in making heat, and corrosion-resistant sheet metal parts with the California company's half-century ceramics production experience and extensive facilities.

Contract Award—PENNSYLVANIA SALT MFG. CO., has awarded a contract to the Contracting Div. of Dravo Corp., Pittsburgh, for construction of a new dock on the Tennessee River, Calvert City, Ky.

"And now for a real quenching operation."

Power Cable — PHELPS DODGE COPPER PRODUCTS CORP., is manufacturing a 230,000-volt pipe-tube power cable for Bonneville Power Administration, U. S. Dept. of the Interior. The cable will be used as a full scale model for the installation of the highest voltage submarine cable in the world, scheduled to cross Puget Sound near Seattle.

Yugoslavian Contract—An order for six electric furnaces for melting of pure copper valued at $200,000 has been awarded to RUSS ELEKTROOFEN CO., Cologne, Germany, by the Yugoslavian government. This contract, which includes all equipment, electric motors, switchboards, relays, and hydraulic lifting machinery, was obtained in open competition with companies all over the world. Offices have been opened in New York at Suite 759, 1775 Broadway.

Electronics Division — NATIONAL ELECTRIC PRODUCTS CORP., Pittsburgh, has established an Electronics Div. which will consist of two departments: Television & Radio, located at the Ambridge, Pa., plant, and Radar, located at the new million-dollar Elizabeth, N. J., plant.

American Tool Holder—All manufacturing and selling rights to the American Tool Holder, formerly produced by American Stay Co., East Boston, Mass., have been acquired by Walton Co., West Hartford, Conn. This will now be known as "WALTON-AMERICAN TOOL HOLDER.

Subsidiary Formed — Christiansen Corp., Chicago, has formed a wholly-owned subsidiary named TITANIUM CO. OF AMERICA. This corporation plans the construction of facilities for the manufacture of wrought products for industrial and military markets from titanium.

Set Records—Steel production at the Indiana Harbor Works of INLAND STEEL CO., set new all-time weekly and monthly records in March, when they reached a production of 332,714 ingot tons. This represented 106.3 pct of capacity and replaced a former record of 337,794 tons.

Pouring Open Hearth Steel . . .

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MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

Demand in High Gear, Output in Low

Spring pushes customers into showrooms . . . Wary of price increase . . . Competition continues in experimental cars . . . GM's LeSabre known as lab on wheels — *By R. D. Raddant.*

The annual spring desire of car drivers to hit the road in new models has begun to materialize with most salesrooms finding more customers than they have cars to distribute.

However, the fact that demand is outstripping production is principally due to production cutbacks, which caused a depletion of inventories, rather than an unusually strong rush to purchase new models.

The feeling of the buying public that prices are too high extends into the industry as well. Even if steel prices should be boosted as a result of the steel wage talks, auto companies would do their best to keep from increasing prices. If a price raise becomes inevitable, they may make it as small as possible.

Could Take More — Fear of pricing autos out of buyers' range is indicated in the reluctance of some companies to take advantage of price increases they would have been entitled to under the Capehart Amendment.

For example, Ford could have taken a 4.9 pct boost on Ford models but took only 3 pct. On the Mercury, 3.45 pct was allowed while prices were raised only 1.8 pct. On Lincolns, 5.19 pct increase was authorized but only 1.8 pct taken.

These percentages vary throughout the industry and the Ford figures should not be taken as standard.

Walker A. Williams, vice-president for sales and advertising, said that Ford dealers average less than three cars to a dealer and that the Ford market appears to be "one of the best on record."

Super Hot-Rods—Latest, if not last, word in the experimental model debate was heard from Chrysler Corp. when it put on display in New York the new C-200, its latest experimental convertible.

This competition in experimental cars of the future is a new thing in the automotive industry. It got its start in 1951 when General Motors introduced its first super hot-rod, a custom two seater known as LeSabre.

Since then most of the companies have followed suit with sleek, low-slung, high-powered custom jobs of their own. Each was designed to capture the fancy of the auto-buying public, although none was built for the market.

But even after the cycle was completed, GM's LeSabre remained the only model that was experimental throughout, from the engine to built-in jacks and hundreds of other new devices.

Pays Off—In terms of public relations and advertising, GM found that the cost of LeSabre was returned many times over. Known as the "laboratory on wheels," it has been viewed by millions in the United States, Europe, and Canada.

It has covered almost 8000 miles under its own power and on each of these miles some important or influential person was a passenger or at the wheel.

Not only are the experimental models eye catching in their low, futuristic designs, but their names are equally unique. The Chrysler C-200 was preceded by another experimental Chrysler, the K-310. Ford produced the Continental 195X and Buick the XP-300.

Chrysler's C-200, although designed here, was constructed by Ghia, custom body builder in Turin, Italy.

Wire Wheels—A low convertible less than 5 ft to the windshield top, it shows the European effect with wire wheels and long hood.

Turn Page

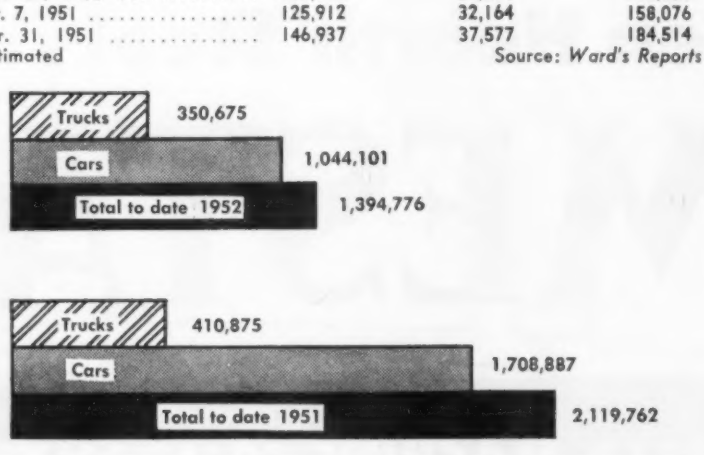
Automotive Production

(U. S. & Canada combined)

WEEK ENDING	CARS	TRUCKS	TOTAL
Apr. 5, 1952	98,401*	28,638*	127,039*
Mar. 29, 1952	101,776	31,074	132,850
Apr. 7, 1951	125,912	32,164	158,076
Mar. 31, 1951	146,937	37,577	184,514

*Estimated

Source: *Ward's Reports*



Another development of the experimental car competition is a mild feud between European and American design. Nash went heavily for European styling with Pinin Farina designing not only the experimental sports car but the entire 1952 line.

Recently Packard unveiled its Pan American placing considerable emphasis on its "all-American" design. Chrysler took special pains to explain that its C-200 was conceived in Detroit and that only because of heavy pressures on its engineering staff from dual defense and civilian production was its constructions farmed out to the Italian builder.

Laid-Off Worker Pool Planned

Chrysler Corp and United Automobile Workers (CIO) joined together in the development of an employment pool to provide job opportunities to laid-off workers *wherever* available in any of the company's 14 Detroit area plants.

Effective May 1, names of all laid-off seniority workers will be placed in a central file. Names will be drawn from the top according to seniority when jobs for which a worker is qualified open up in one of the company's plants.

The plan was developed by John D. Leary, director of labor relations, and Norman Matthews, director of the union's Chrysler department.

Willys Gets New Jeep Contracts

The Army's workhorse, the Willys-Jeep, is being counted on for more extensive use, latest military orders indicate.

An order for $149 million in Jeeps, with options on $178 million more was placed with Willys-Overland last week. It is the largest order since World War II and almost equal to the total number bought since the end of these hostilities, said Ward M. Canaday, company president.

These latest jeeps will be waterproofed so they can operate with their motors submerged.

Quotas:

Ford appeals NPA denial of request for base period revision.

Ford Motor Co. jumped into a fight for more competitive freedom in auto production in its appeal of a National Production Authority denial of a petition for more materials.

If successful, the appeal will result in a revision of the base period which now determines how much material each manufacturer will be allowed for auto production. The effect would be more for the Big Three and Studebaker at the expense of the independents.

Ford wants the base period of 1947 to 1949 extended to include the last half of 1949 and the first half of 1950. Ford charges that the present NPA base caused the company to lose more than $220 million.

Strike-Bound—One reason that this period was not included was that Chrysler was strike-bound for 103 days of 1950, Courtney Johnson, NPA motor vehicle director, explained. Ford's substitute plan would provide for an adjustment to Chrysler for the period which it considers the most representative prior to Korean hostilities.

Implication by Ford is that the independents have benefited more by the cutbacks than they deserved. It will all be thrashed out by the NPA appeals board Apr. 29 in Washington.

Ford's proposal would give the Big Three and Studebaker 87.68 pct of materials instead of 83.48 pct they receive now. Ford itself would get an increase from 20.434 pct to 22.53 pct. General Motors would benefit from 41 pct to 42.6 pct, Chrysler from 21.67 pct to 22.89 pct and Studebaker from 4.13 pct to 4.32 pct.

Altogether it would involve a shift of about 4 pct of the total industry production.

THE BULL OF THE WOODS — By J. R. Williams

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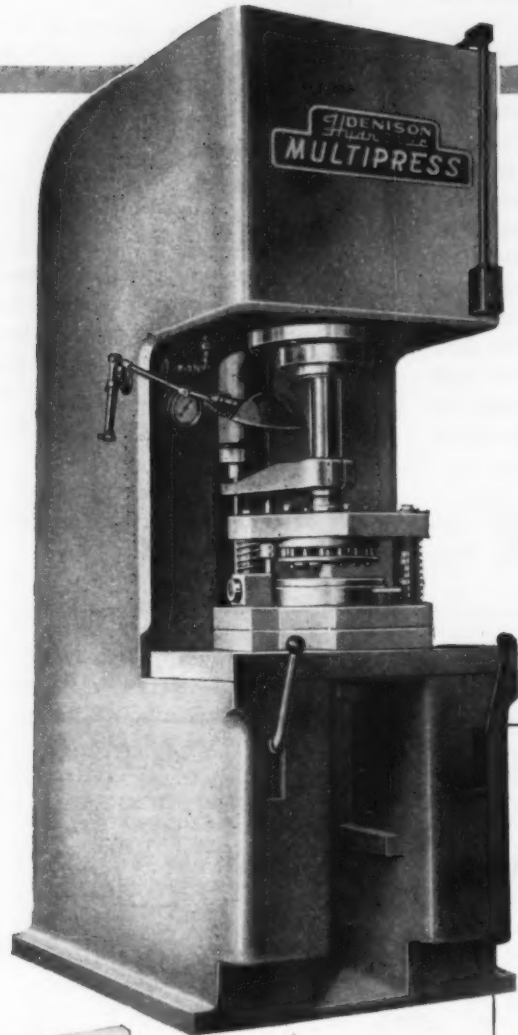

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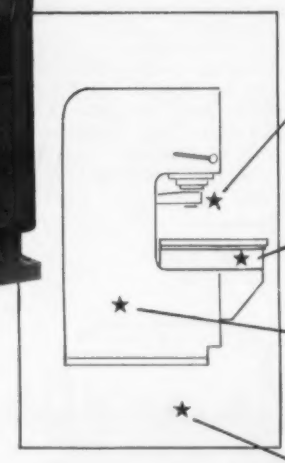

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Mixed Reactions as Kaiser Settles

Survey yields reactions ranging from approval of settlement with union to bitterness . . . See break in industry front . . . Kaiser prices put firm in better position to take wage rise.

Mixed reactions from other steel producers, distributors, and consumers greeted Kaiser Steel Corp.'s settlement with the steelworkers' union for the package deal worked out by Wage Stabilization Board.

A careful cross-sectional check of all facets of the industry brought out comments ranging from "reprehensible" to "it's best for West Coast industry." A few good customers of Kaiser did not approve of settlement with the union, mentioning steel price increases that now seem inevitable.

Better Off—It was pointed out that Kaiser Steel already maintains prices equal to or higher than West Coast competitors—with but few exceptions. Hence even if a small token price increase is granted to the industry by Office of Price Stabilization, Kaiser would not be in as bad a position as most.

Agreeing to the union shop precented no real problem to Kaiser Steel because its operation is already on a closed-shop basis. But other producers look on the union shop issue as one on which they cannot yield.

Pass Rise Along—A few warehousemen on the Kaiser customer list may have fretted that settlement with the union was an inflationary influence but from the standpoint of economics they were protected. They planned to pass along any price increases to their customers. Incidentally, many were glad that their source of steel would not be cut off. Others not on the Kaiser list may have reacted differently.

The crack in the wall of industry solidarity against the union bothered other steel producers in the area. Independent producers are now more vulnerable to union demands. Rumor had it that the union was taking advantage of the Kaiser settlement to push its case.

Scrap Embargo—Steel producers in the West decided that they would not accept any more scrap shipments after midnight on Friday of last week. They were not convinced a strike wouldn't be called on Apr. 8 and did not want to face demurrage charges.

With healthy inventories, western producers were not in a weak scrap position.

Out From Under—A practical solution to the plant dispersal program is being developed by the San Francisco Bay Area Council which will clarify where defense supporting industries may be located.

Stanford Research Institute is collaborating to set up criteria for locating plants which will be out of the vulnerable zone of dense populations and concentrated industries. The National Security Resources Board is studying the proposal which includes a 20-mile "buffer" zone surrounding the city of San Francisco, considered a potential target zone.

"Oh, my yes, we have other machines on order."

Try On for Size—Bonneville Power Administration has awarded a contract to the Phelps Dodge Copper Products Corp. of New York for approximately 900 feet of 10-in. steel pipe and copper cable for test purposes. The test cable will be used as a model for a planned 4½-mile cable to span Puget Sound, north of Seattle, in 1954.

The test will help solve problems expected in installing the cable in water at depths up to 700 ft. The line will carry 230,000 volts.

Hunk of Steel—One of the largest and heaviest loads of steel to move through Seattle streets was hauled from Isaacson Iron Works to Seattle Pacific College last week. Fifty-five tons of steel in five 115-ft-long trusses was hauled through town on three trucks in the early morning hours to build a new pavilion for Seattle Pacific College.

Light Metal Soars—South Gate Aluminum & Magnesium Co. in Los Angeles is spending a quarter million dollars of private capital to build a plant addition to be completed within 60 days to machine aluminum and magnesium castings. Further developments are expected to make this one of the most advanced plants for working light metals on the Coast.

M.T.

When Does a Band Saw Become a Machine Tool?

There are basic requirements of accuracy and proficiency that separate a "machine tool" from other power tools . . . characteristics such as those which distinguish a tool maker's screw-cutting, precision lathe from the woodworking lathes used in grade school manual training classes. Among metal-cutting band saws, only the MARVEL No. 8 Series Band Saws can qualify as **machine tools**, for only MARVEL Band Saws have the following capabilities and features:

1 Angular cutting from 0° to 45° right or left **without** moving the work. Built-in protractor.

2 Vertical blade power-fed into material—permits re-entrant cuts, notching. mitering, keyway sawing, etc.

3 Automatic power or manual feeds at the flick of a finger.

4 Feed pressure adjustable even when machine is running. Indicated in actual pounds of pressure.

5 Work clamped to table of machine. Working area more than 835 square inches.

6 Tee-slotted table facilitating clamping down of odd and irregular shaped pieces; easily supports heavy work or large and long structural shapes. Standard vise chucks work on either side of blades.

7 Automatic blade tensioning device. Every blade at uniform tension regardless of operator efficiency.

8 Adjustable upper guide roller holder insuring minimum section of unsupported blade on all sizes of material. Quick acting.

9 Built-in coolant system with delivery at blade entry point. Pump driven without belt or gears.

10 Replaceable vise ratchet and table wear strips of tool steel. New saw performance at all times.

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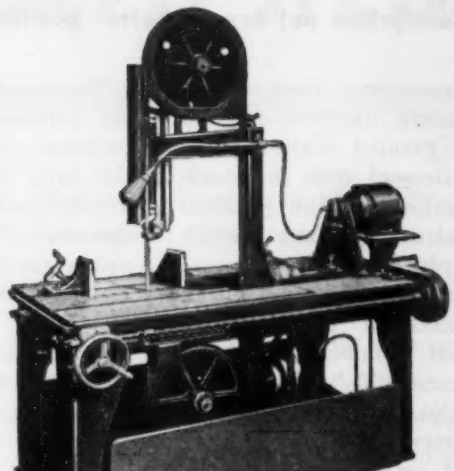

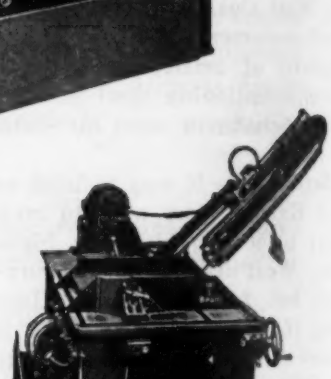

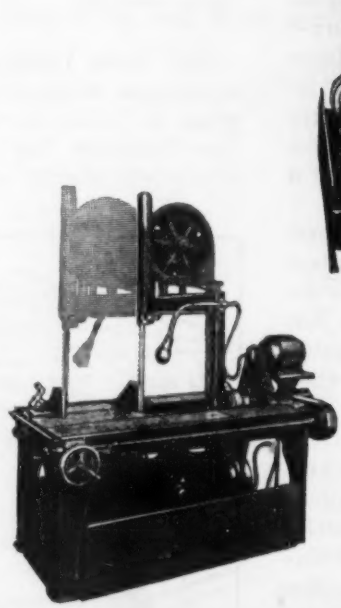

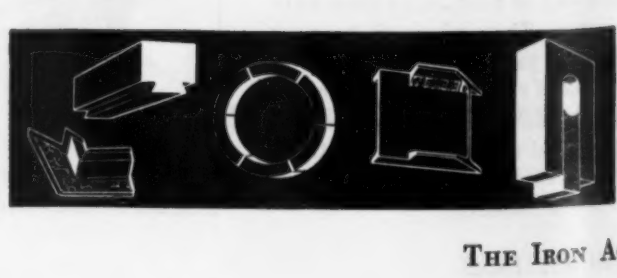

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5700 Bloomingdale Ave., Chicago, U. S. A.

MARVEL Metal Cutting SAWS
Better Machines-Better Blades

Tool Commission Stalled, Not Killed

Wilson's quitting won't kill Washington plan for machine tool commission . . . Clay Bedford's around to carry ball . . . Order cancellations high . . . "No" on non-rated—*By G. Elwers.*

The resignation of C. E. Wilson as mobilization boss has delayed but won't kill government plans to aid the machine tool industry.

His expected announcement of a new machine tool commission was delayed by preoccupation with the steel strike crisis. And now of course he's not around to make it.

But a powerful worker for machine tool action is still around: Clay Bedford, Special Assistant to the Secretary of Defense. It's a safe bet that he will continue to push the plans for a commission to study Washington tool policy.

Order Cancellations — Data reported to the National Machine Tool Builders' Assn. show that order cancellations were a whopping 49 pct of new orders in February. In January, they were about 16 pct of that month's new orders.

But this flood of cancellations is now over, and the industry looks forward to a continued high rate of business.

Healthy Rise — Just what this rate is expected to be was indicated at last week's Westinghouse Machine Tool Forum by Tell Berna, general manager of the NMTBA. He told the Forum that the production rate of machine tools, including presses, is expected to rise to about a $100 million monthly level, and hold there through 1954.

The most recent figure, for metal cutting machine tools only, is shipments of $81.6 million in the month of February.

This compares with $33.8 million in January, 1951, and $78.2 million in December, 1951.

No Non-Rated Jobs—The NPA has made it clear it has no intention of permitting work on non-rated machine tools in the foreseeable future (THE IRON AGE, Apr. 3, p. 101). It's also clear the NPA feels that such action would interfere with war production.

This again points up two basic defects in Washington handling of machine tool problems: Lack of understanding of the industry, and ignorance of the lessons of World War II.

Done Before—Non-priority production was permitted in the last war. There has never been a suggestion that this interfered with war production. War work came first, but there was no reason why any excess capacity shouldn't be used for civilian work.

Lack of understanding is evident in the apparent NPA belief that since there is a machine tool shortage, there is no capacity available for work on civilian machines. But the actual truth is that there is excess capacity in many machine tool plants.

"I take it you're from maintenance."

One Foot in Defense—Some machine tools are in short supply. Others are not. The plants which do not have enough business to run full blast are in that condition because the equipment they make is not needed in quantity in the defense effort.

They, quite naturally, wonder why they can't use their excess capacity in work on non-rated machines. They feel they can get the materials they need for such work without priorities.

Plot Against Michigan? — Although the deal for Fisher Body to build Bullard vertical turret lathes is dead, the memory lingers on. It is being kept alive these days mostly by Sen. Blair Moody (D., Mich.), member of a Senate small business subcommittee.

Sen. Moody has sometimes talked as though he thinks cancellation of the deal was a plot to cause unemployment in Michigan. He got the true story in hearings last week.

Vanishing Demand—Representatives of Bullard and of American Steel Foundries were the witnesses. The King Div. of American Steel Foundries also makes large vertical boring mills. Both told how the Air Force had insisted on huge expansion of boring mill production, then was unable to find contractors who needed large numbers of the machines.

"We were told Buick alone would need 400 for jet engine production," said Bullard's F. U. Hayes. But when Bullard tried to get an order from Buick, "we were considerably surprised to learn that they would require none at all." Buick said this was due to readjustment of its jet contracts.

To dust they shall return...

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WEATHER . . . WATER . . . ACID . . . ALKALI All these forces shorten the life of metal equipment. INSUL-MASTIC homogenized coatings, however, will stop them from reaching the metal.

WEATHER . . . WATER . . . ACID . . . OR ALKALI solutions cannot break down INSUL-MASTIC coatings. Weather-O-Meter tests as well as actual results in the field have definitely proven the exceedingly long life of INSUL-MASTIC —outlasting other coatings by many years.

THE REASON IS EASY TO UNDERSTAND. Having no by-products, we are free to choose the very best materials for long lasting corrosion prevention. Research has proven these to be Gilsonite, carefully chosen asbestos fibre and mica flake in large proportions. The result is a heavy coating ($\frac{1}{16}$" to $\frac{1}{8}$") having considerable physical and chemical endurance. The National Bureau of Standards confirms our choice of such a coating formula.

PROPER APPLICATION is also important to long coating life. The INSUL-MASTIC licensee near you is expert at surface preparation and application.

Where acids and alkalis assail . . . where rust and corrosion prevail . . . specify the coatings used successfully under the most corrosive conditions. They are the coatings used by industry, including the best known chemical processing plants. Equipment in these plants must have protection. *That is why engineers specify INSUL-MASTIC. We will be pleased to send you the names of some of these plants on request.*

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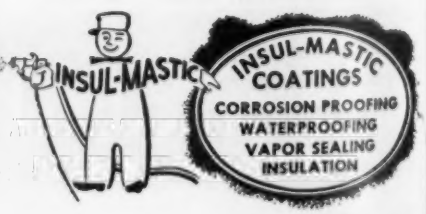

The Iron Age

SALUTES

H. D. North

Friendly, aggressive and a sound merchandiser, he's put his energies to work for the industry.

ONE of the best records in the cap screw industry belongs to H. D. "Bub" North. From shipping clerk at his company's start in 1907 he has risen to the top executive position of president. During these 45 years he has watched the industry grow to tremendous proportions without losing the youthful perspective and enthusiasm of those earlier days.

Friendly, aggressive and a sound merchandiser, "Bub" North has always stressed selling rather than pricing. His striving for quality borders on the fanatical.

He's put these qualities to work not only for his company but for the industry as a whole. As president of the United States Cap Screw Bureau during the 1930's, he was chairman of the Code Committee which drafted a code of practice for the set screw industry under the National Industrial Recovery Act.

While chairman of the board of the Fabricated Metal Products Federation he directed the drafting of an NRA code for a wide variety of metalworking industries ranging from hair pins to plowshares.

A firm believer in sound labor management, his 17 years as president of The Ferry Cap & Set Screw Co. have been unmarked by any major labor troubles.

"Bub" divides most of his spare time between Cleveland's Hermit Club, where for years he has tooted a bass horn as big as he is, and the Rocky River Yacht Club. Other hobbies include photography and fishing.

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As one of the few "full line" fastener manufacturers, Lamson can greatly simplify your fastener procurement. For they can supply practically any type or size of bolt, nut or screw plus many special fastening devices such as wire rope clips, cotters and threaded studs.

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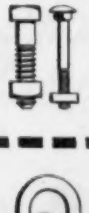

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Semi-finished, hot pressed, cold punched.

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Precision made for fast, economical assembly.

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Steel, brass, aluminum and stainless steel.

"BENT BOLTS"
Including U bolts, eye bolts, hook bolts, etc.

The Iron Age

INTRODUCES

Walter **Ising**, elected president; **Norman A. Shapiro**, elected executive vice-president; **W. C. Bruns**, elected secretary-treasurer; and **Ben Gore**, appointed director of sales, LAUBE STEEL CO., Chicago.

W. J. **Sparling**, appointed vice-president and manager, Milwaukee operations; **M. G. Jewett**, appointed manager, Chain & Power Transmission Div.; **A. K. Thomas**, appointed manager; **W. A. Clayton**, becomes sales manager; and **J. W. Lendved**, appointed director of engineering, Construction Machinery Div., CHAIN BELT CO. OF MILWAUKEE.

Carl G. **Levin**, elected vice-president and secretary; **M. W. Isaacson**, elected vice-president and sales manager; and C. **Chandler Cole**, elected vice-president and comptroller, POWDERED METAL PRODUCTS CORP. OF AMERICA, Chicago.

E. C. **Webb**, appointed vice-president in charge of production and engineering, IRON FIREMAN MFG. CO., Cleveland.

Paul W. Heasley, comptroller, appointed vice-president and comptroller, and **Lloyd R. Everhard**, secretary, appointed secretary-treasurer, TRAILMOBILE, INC., Cincinnati.

Marshall N. Austin, appointed manager, Columbus sales office, WESTINGHOUSE ELECTRIC CORP., Pittsburgh.

Benjamin T. Moffatt, vice-president, elected executive vice-president; **Harold Von Thaden**, continues as vice-president and becomes general manager, International Div. in addition to the Robins Engineers Div.; **Austin Goodyear**, appointed general manager Hewitt Rubber Div. and Robins Conveyors Div.; and **Robert A. Nilsen**, becomes general manager, Restfoam Div., HEWITT ROBINS, INC., New York.

George H. Greene, appointed chief engineer, Johnstown, Pa. plant, BETHLEHEM STEEL CO., Bethlehem.

Norman C. Halleck, appointed assistant to general superintendent in charge of cost control, Gary Works, U. S. STEEL CO., Chicago. **Grove R. Ginder**, will succeed him as assistant plant industrial engineer.

John L. Wiedey, formerly application engineer, switchgear section, named sales representative, Indianapolis district office; **Eugene P. Morton**, appointed assistant engineer, process laboratory; and **W. F. Dueringer**, named engineer-in-charge of sales, steam turbine section, ALLIS-CHALMERS MFG. CO., Milwaukee. **C. R. Bloom**, succeeds Mr. Dueringer as supervisor of sales of units.

H. R. Letzter, appointed sales manager, industrial division, WEBSTER-CHICAGO CORP., Chicago.

J. D. Greensward, appointed manager, newly organized apparatus department, ALLIS-CHALMERS MFG. CO., Milwaukee.

James J. Edwards, appointed works manager, dual purpose plant, Arlington, Tex., GENERAL MOTORS CORP., Detroit. **John T. Quill**, appointed director of purchases; **George Marzonie**, appointed plant engineer; **Donald C. Stewart**, appointed master mechanic; and **Robert T. Weiser**, appointed personnel director.

Wallace L. Nahin, appointed sales manager, Distillation Div., CLEAVER-BROOKS CO., Milwaukee.

FREDERICK W. PARKER, JR., appointed executive vice-president, Timken-Detroit Axle Co., Detroit.

JUSTICE LOCKWOOD, appointed vice-president in charge of sales, American Brass Co., Waterbury, Conn., a subsidiary of Anaconda Copper Mining Co., New York.

HOWARD J. DAVIS, appointed assistant to the president, Colorado Fuel & Iron Corp., Denver.

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1003 Fisher Bldg., Detroit 2, Mich.

Personnel

Continued

R. A. Bowman, appointed plant manager, to succeed **Martin L. Killgallon**, who has resigned, OLIVER IRON & STEEL CORP., Pittsburgh.

Joseph T. Bailey, named manager of marketing; **F. Wiley Hubbell**, named manager of finance; **William F. Oswalt**, named manager of manufacturing; and **Hal W. Poole**, named manager of engineering, Industry Control Dept., GENERAL ELECTRIC CO., Schenectady. **Alan Howard** appointed manager, Engineering Dept., Turbine Div., and **John P. Keller**, appointed general manager, Gas Turbine Dept.

George D. Stroman, appointed assistant to the superintendent, Miscellaneous Finishing Dept., LUKENS STEEL CO., Coatesville, Pa.

C. H. Schwerin, appointed manager of sales and sales engineering, GEORGE J. HAGAN CO., Pittsburgh.

Leo P. Sinclair, appointed field engineer, DACO MACHINE & TOOL CO., Brooklyn.

Donald E. Beaton, appointed assistant general manager, Hydraulic Div., Rockford, Ill., TWIN DISC CLUTCH CO., Racine, Wis.

Richard S. Jones, formerly sales representative, named manager of stainless steel sales, A. B. MURRAY CO., INC., McKeesport, Pa. plant. **C. J. Rice** succeeds Mr. Jones as sales representative in central and western Pennsylvania.

Joseph J. Thomas, appointed assistant sales manager, NORTH AMERICAN REFRACTORIES CO., Cleveland.

William C. Bullock, named engineer's assistant, Pittsburgh Works, ALLIS-CHALMERS MFG. CO., Milwaukee.

Edwin S. Hunt, Jr., promoted to newly created position of export manager, Waterbury Div., PLUME & ATWOOD MFG. CO., Waterbury, Conn.

Donald W. Bedell, appointed industrial relations assistant to **L. C. Ricketts**, vice-president in charge of manufacturing, WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J.

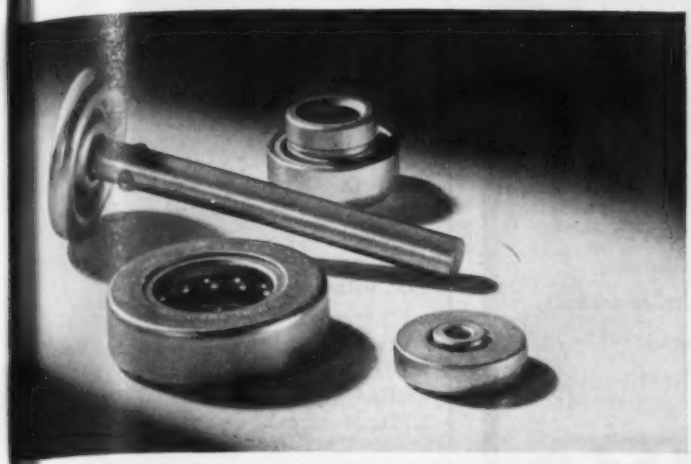
JOE E. KIEFER, appointed vice-president in charge of sales and engineering, Franklin Corp., Youngstown.

WILLARD M. BROXHAM, named vice-president in charge of sales, Graver Tank & Mfg. Co., Inc., East Chicago, Ind.

CLYDE W. SMITH, appointed assistant to the president, Kollsman Instrument Corp., Elmhurst, N. Y.

CHARLES E. WALKER, named to the new position of manager of engineering and production, Vulcan Mold & Iron Co., Latrobe, Pa.

PRESS BREAKDOWNS ENDED BY SUNTAC



NO MORE MANUFACTURING DELAYS. The manufacturer of these bearings uses heavy-duty presses to blank out parts. The problem of press bearing failures due to inadequate oils has been eliminated by changing to Suntac.

CLEAN FLOOR, CLEAN MACHINE. Adhesiveness prevents Suntac Oil from squeezing out of the bearings. Before Suntac was used, floors had to be cleaned constantly to keep them from becoming slippery and dangerous.

A large ball-bearing manufacturer was having trouble with the oil used in some older heavy-duty presses. At frequent intervals the machinery had to be shut down due to bearings overheating. Because the oil would not *stay in*, bearing life averaged only eight months. Each failure took a press off the line for a month or more. Floors had to be cleaned constantly to keep them from becoming slippery and hazardous. Many different oils were tried in an effort to remedy the situation, but none proved adequate for the job, and production suffered.

Finally the company called in a Sun representative for consultation and changed to a Suntac Oil at his suggestion. Results were excellent, and the presses have operated without a bearing failure ever since. The adhesiveness of Suntac prevents it from squeezing out and keeps the bearings running cool. For the same reason the floors around the presses are free from oil-drip. Oil consumption has been cut 50 percent.

If you are having trouble keeping old or worn equipment *on the job*, use the coupon below.

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☐ Please have a Sun representative call.
☐ Send me your booklet "Suntac Oils Case Histories."
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TECHNICAL ASSISTANCE AVAILABLE. Sun's engineers are at your service for consultation on lubrication matters. It will pay you to utilize the broad experience they have gained in solving a wide variety of problems in many different industries.

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Personnel

Continued

John N. Crombie, appointed metallurgical engineer, metallurgical division, U. S. STEEL CO., Pittsburgh.

T. W. Mertney, appointed service technical manager, Parts and Service Dept., PACKARD MOTOR CAR CO., Detroit.

M. D. Gilbert, appointed Kansas City District sales manager, and **Roy R. Bush,** appointed Tulsa District sales manager, ROCKWELL MFG. CO., Pittsburgh.

Herbert J. Purcell, appointed material procurement manager, MONTREAL LOCOMOTIVE WORKS, LTD., Montreal.

William H. Peters, appointed manager of manufacturing, WILLYS-OVERLAND MOTORS, INC., Toledo.

Russell H. Randolph, appointed general sales director, FAGEOL HEAT MACHINE CO., Detroit.

Jack B. Grieser, joins the sales staff METAL SPRAY CORP., Milwaukee.

OBITUARIES

Arnold C. Hackstaff, 57, manager, Denver district sales office, Youngstown Sheet & Tube Co., Youngstown.

Fred C. Flosi, 53, vice-president and treasurer and a director, A. M. Castle & Co., Chicago.

Francis Fargo Gregory, merchandising coordinator, A. O. Smith Corp., Milwaukee.

Lawrence E. Green, 55, chairman of the board of directors, Cleveland Pneumatic Tool Co., Cleveland.

Ray Robert Smith, president, Milwaukee Forge & Machine Co., Milwaukee.

Lucian E. Kinn, 65, president and general manager, Seneca Wire & Mfg. Co., Fostoria, Ohio.

Walter Clarke Hemingway, 64, president, Pittsburgh Steamship Div., U. S. Steel Co., Atlantic City, N. J.

William D. Keefe, 54, manufacturers' agent and former sales manager, Refrigeration Div., Fedders Mfg. Co., Buffalo.

the Iron Age
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Technical Articles

VAPOR DEPOSITION

may solve today's coating problems

Vapor deposition, invented and given up 50 years ago, is being revived. Dense and uniform coatings of metals, alloys and non-metals can be deposited on one another at temperatures far below melting points. Process can be continuous and is generally carried out at atmospheric pressure. Induction or resistance heating gives highest efficiencies, and temperature of surface being coated is most critical factor. Wire, rod, tubing, strip and shapes have been successfully coated.

By I. E. Campbell and C. F. Powell
Battelle Memorial Institute
Columbus, Ohio

Methods must sometimes be used that cannot compete on a cost basis with commercial practice. This is because they can accomplish a job for which the less expensive methods are not applicable. This has been particularly true in the coating field, where research investigators are looking for new techniques.

This search for something new has led to something old enough to be new. One of the most generally useful and versatile techniques for applying refractory coatings has proved to be vapor deposition. Vapor deposition was used over 50 years ago by investigators seeking a means of forming tungsten filaments for the incandescent light industry. The method did not gain commercial acceptance, however, and vapor deposition was neglected until recent years.

Vapor deposition is a broad term and not truly descriptive of the process. It is best described as the formation of a coating by chemical reaction at a heated surface.

For example, a metal coating may be applied by passing a volatile metal chloride and hydrogen over a heated underbody. Since the temperature need only be high enough to produce a reasonable reaction rate, the deposition may be carried out far below the melting point of the material involved. Tantalum, with a melting point of 3000°C, can be deposited at temperatures as low as 500° to 600°C. Although the coatings are deposited below the melting point of the coating material, they are dense and have the same properties as fused metals or compounds of comparable purity.

The method is quite flexible and versatile. It is applicable to the formation of a wide variety of refractory coatings, including carbides, borides, nitrides, silicides, and oxides. A few of these are included in the accompanying table.

The majority of the coating processes are carried out at atmospheric pressure. However, in many cases, the advantages of operating at reduced pressure are sufficient to warrant the somewhat more involved technique.

Despite the wide variety of chemical reactions involved, the coating procedure is substantially the same in all cases. The plating atmosphere is forced past the heated underbody. By-products of the reaction are vented or pumped from the system or, in some cases, condensed in the exhaust.

In many cases, a carrier gas is used. The carrier may be inert, as in the case when helium is used to transport metal carbonyls. Or it may be reactive, as when excess hydrogen is used as the carrier in halide reductions.

The specimen is best heated internally, induction or resistance heating being most commonly used. External heating can be employed in some cases, but the plating efficiency is frequently low when external heating is used. This is because deposition occurs on the walls of the plating chamber.

A schematic diagram of a laboratory appa-

ratus for continuously coating electrically heated wire is shown in Fig. 1. Equipment for coating inductively heated nozzles is shown in Fig. 2. Although the apparatus shown in Fig. 2 cannot be used in continuous operation, equipment has been developed for moving specimens continuously through induction furnaces.

The metals, with the exception of osmium, ruthenium, and probably iridium, can be deposited in ductile form. They can be made hard and brittle, however (and often inadvertently are), by the addition of traces of carbon, oxygen, nitrogen, or hydrogen compounds to the plating atmosphere. Except for tantalum silicide and to a certain extent molybdenum silicide, the carbides, nitrides, borides, silicides, oxides, boron and silicon are all hard and brittle.

Of the several factors which influence the nature of the deposit, the specimen temperature seems to be most important. Lower temperatures usually favor more finely crystalline deposits and high temperatures more coarsely crystalline deposits. Virtually amorphous deposits are obtained at the lowest deposition temperatures. Crystals several millimeters in diameter are deposited at the higher temperatures.

At high temperatures, monocrystalline or pseudo-monocrystalline deposits can be obtained if a monocrystalline base is used. At medium or low temperatures, the structure of the base has little or no effect upon the form of the deposit. The maximum deposition temperature in any case is generally the melting point of the base, of the coating or of any reaction product or solid solution formed between the base and the coating. Microphotographs of typical coatings are shown in Figs. 3 and 4.

The specimen temperature also effects the adhesion and cohesion of the deposit. The less stable plating compounds tend to be reduced or decomposed before they reach the heated surface. This tendency becomes more pronounced at higher deposition temperatures. Premature

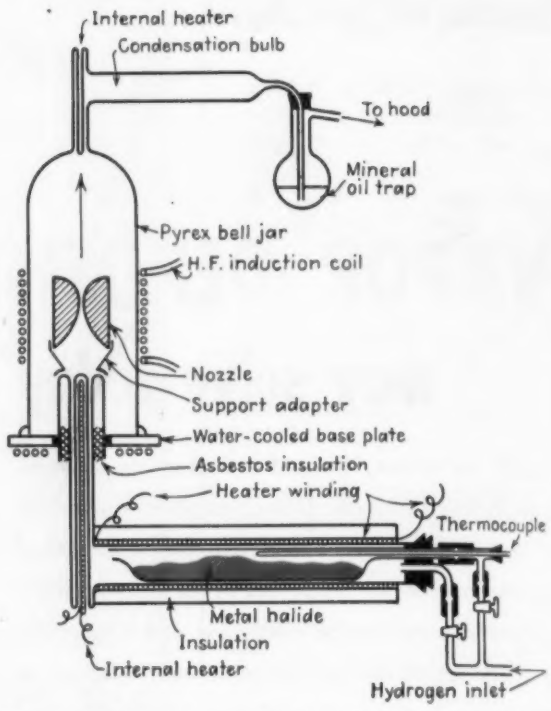


FIG. 2—Equipment for coating inductively heated nozzles.

decomposition on reaction results in the formation of nonadherent powder deposits or the formation of nonvolatile decomposition products which are blown out of the plating zone before deposition can occur.

The effect is especially noticeable when depositing columbium, tantalum, molybdenum and tungsten by: (1), hydrogen reduction of halides such as silicon dioxide, alumina, zirconium oxide: (2), $CO_2 + H_2$ oxidation of the halides; (3), in the pyrolysis of carbonyl and carbonyl halide compounds involving chromium, molybdenum, tungsten, ruthenium, rhodium, osmium, iridium, platinum. The difficulty can be avoided by lowering the specimen temperature or reducing the pressure of the plating atmosphere.

The concentration or pressure of the reactants in the plating atmosphere affects the

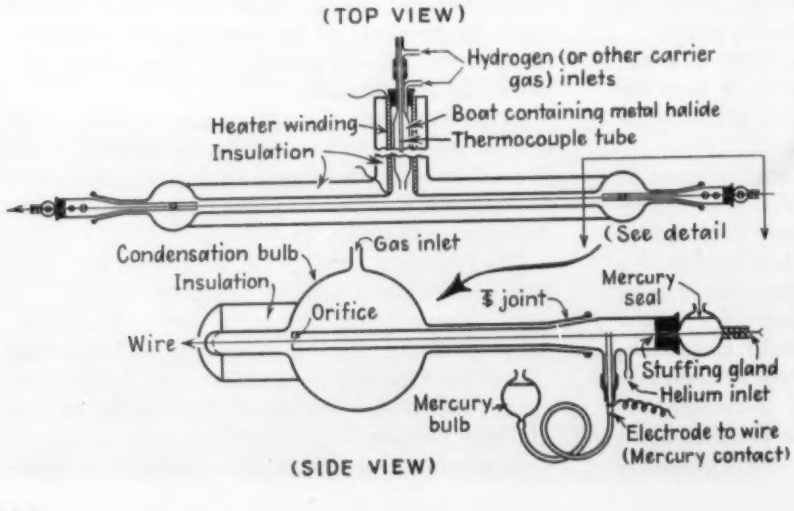
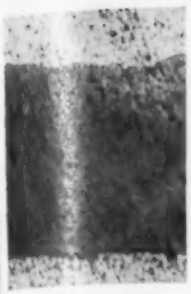


FIG. 1—Schematic arrangement of apparatus for the continuous coating of wire by vapor deposition.



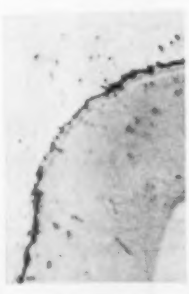


FIG. 3—Some typical coatings obtained with vapor deposition. From top to bottom: tantalum on 0.072-in. diam oxygen-free, high conductivity copper wire, 15 min at 900°C, 666X; tantalum on high purity iron, 30 min at 1000°C, 187X; tantalum on nickel, 1300°C, 562X; Chromized molybdenum (pack method), 6 hr at 1000°C, 375X; chromium on molybdenum, di-iodide decomposition in vacuum, 1 hr at 1000°C.

crystallinity of the deposits. The lower the pressure the more coarsely crystalline is the deposit. Thermal decomposition of compounds in vacuum usually results in deposits of readily visible crystal. Coatings made at atmospheric pressure are usually microcrystalline.

Impurities such as oxygen, water vapor, or oxyhalides in the plating atmosphere may exert a pronounced effect in the form of the deposit as well as its properties. Oxygen or nitrogen form nitrides or oxides in the deposit, making it difficult to obtain smooth deposits. The most pronounced effect of impurities is the embrittlement of refractory metals such as tantalum, titanium, or vanadium. This is caused by rather small quantities of oxygen, nitrogen or carbon.

The purity of the deposit depends upon the purity of the starting materials and upon the plating conditions. In the hydrogen-reduction process, the desired halide compound should be free of other volatile, reducible halides and of oxyhalides and halogens. The hydrogen used must be free of oxygen, nitrogen, and hydrocarbons if ductile metal deposits are desired.

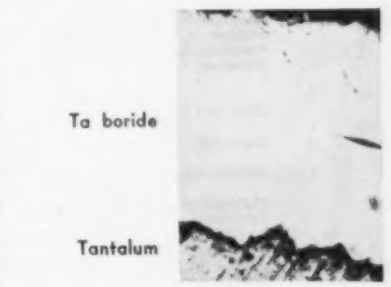
In depositing pure compounds, temperatures and reactant concentrations are so chosen, where possible, that the specimen temperature is above the melting point of the metal component of the coating. The concentration of the nonmetallic component, such as carbon, nitrogen or boron, is less than that of the metallic component as it exists in the desired compound. Thus neither free metal nor free nonmetal is deposited. This arrangement, however, does not prevent the formation of several mutually soluble compounds.

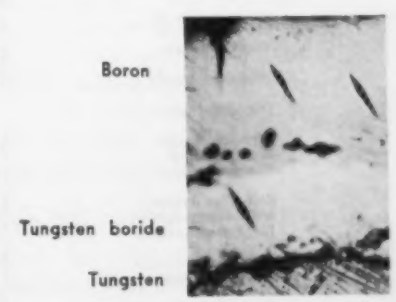
Deposition rates vary with the material deposited and the process used. Hydrogen reduction of certain metal halides proceeds at 7.5 to 65 microns per min. In some cases, particularly with the thermal decomposition processes, much lower deposition rates are obtained.

The thickness of vapor deposits may be varied within a wide range, from a few hundredthousandths to several thousandths of an inch. The average deposit runs from 0.0001 to 0.005 in. in thickness, depending upon the type of service required of the coating.

Coating uniformity depends chiefly upon the uniformities of specimen temperature and of rate of supply of plating atmosphere to all surfaces of the sample. Non-uniform specimen temperatures result in heavier deposits on the hotter portions, except under conditions where the higher temperatures produce premature reaction of the plating atmosphere. Uniform specimen temperatures are most readily obtained with external heating, but at the cost of lower plating efficiency. Internal heating by induction will, in most cases, give uniform specimen temperatures if a judicious coil design has been employed.

A uniform supply of plating atmosphere is





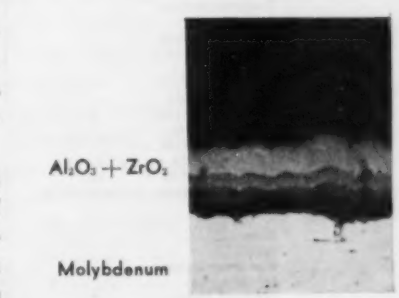


FIG.4—Additional types of coating obtained with vapor deposition. From top to bottom: siliconized molybdenum, 1 hr at 1200°C, 150X; tantalum boride or tantalum, 15 min at 2000°C, 375X; boron on molybdenum 15 min at 1000°C, 375X; boron on tungsten, 15 min at 1500°C, 375X; aluminum and zirconium oxides on molybdenum, 2 hr at 875°C, etched in boiling $H_2O_2 + HF$. 500X.

SOME OF THE TYPES OF COATINGS THAT CAN BE VAPOR-DEPOSITED

Deposit	Deposition Reaction	Deposition Temp., °C	Deposition Pressure	Ductility * of Coating	Oxidation † Resistance of Coating
	Metals				
Titanium	$TiBr_4 + H_2 \xrightarrow{\Delta} Ti + HBr$	900 to 1400	1 atmosphere	1	3
Titanium	$TiI_4 \xrightarrow{\Delta} Ti + I_2$	1200 to 1400	50 mm	1	3
Zirconium	$ZrBr_4 + H_2 \xrightarrow{\Delta} Zr + HBr$	900 to 1400	1 atmosphere	1	3
Zirconium	$ZrI_4 \xrightarrow{\Delta} Zr + I_2$	1300 to 1800	50 mm	1	3
Hafnium	$HfI_4 \xrightarrow{\Delta} HF + I_2$	1600	50 mm	1	3
Thorium	$ThI_4 \xrightarrow{\Delta} Th + I_2$	1700	50 mm	1	3-4
Vanadium	$VI_2 \xrightarrow{\Delta} V + I_2$	1100 to 1200	50 mm	1	4
Niobium	$NbCl_5 + H_2 \rightarrow Nb + HCl$	600 to 1200	1 atmosphere	1	5
Tantalum	$TaCl_5 + H_2 \rightarrow Ta + HCl$	600 to 1400	1 atmosphere	1	5
Chromium	$CrCl_2 + M\ [+ H_2 + HCl \rightarrow Cr + MCl_2$ (M – Fe, Ta, Mo, etc.)	900 to 1200	20 to 760 mm	2	2-3
Chromium	$CrI_2, CrI_3\ [+ He] \xrightarrow{\Delta} Cr + I_2$	1000 to 1400	10^{-3} to 760 mm	2	2-3
Chromium	$Cr(CO)_6 + H_2 \xrightarrow{\Delta} Cr + Cr_2C_2 + Cr_2O_3$	450 to 625	0.04 to 0.22 mm	2	2-3
Molybdenum	$MoCl_5 + H_2 \xrightarrow{\Delta} Mo + HCl$	500 to 1100	1 to 760 mm	2	5
Molybdenum	$Mo(CO)_6 + H_2 \xrightarrow{\Delta} Mo + [C, H, O]$ (a)	450 to 750	<0.75 mm	2	5
Tungsten	$WCl_5 + H_2 \rightarrow W + HCl$	500 to 1100	1 to 760 mm	2	4
Tungsten	$W(CO)_6 + H_2 \xrightarrow{\Delta} W + [C, H, O]$	500 to 800	<10 mm	2	4
Uranium	$UI_4 \xrightarrow{\Delta} U + I_2$	1100 to 1500	0.01 to 1 mm	1	5
Rhenium	$ReCl_3\ [+ N_2] \xrightarrow{\Delta} Re + Cl_2$	600 to 1800	1 atmosphere	1	4-5
Ruthenium	$RuX_2 \cdot YCO \xrightarrow{\Delta} Ru + X_2 + CO$ (a)	600(?)	0.01 to 0.02 mm	3	4-5
Rhodium	$RhX_2 \cdot YCO \xrightarrow{\Delta} Rh + X_2 + CO$	600(?)	0.01 to 0.02 mm	1	1
Osmium	$OsX_2 \cdot YCO \xrightarrow{\Delta} Os + X_2 + CO$	600(?)	0.01 to 0.02 mm	3	5
Iridium	$IrX_3 \cdot YCO \xrightarrow{\Delta} Ir + X_2 + CO$	600(?)	0.01 to 0.02 mm	2-3	4
Platinum	$PtCl_2 \cdot 2CO \xrightarrow{\Delta} Pt + Cl_2 + CO$	600	0.01 to 0.02 mm	1	1
Tantalum-niobium alloy	$TaCl_5 + NbCl_5 + H_2 \rightarrow Ta + Nb + HCl$	600 to 1200	1 atmosphere	1	5
Tantalum-titanium alloy	$TaBr_5 + TiBr_4 + H_2 \rightarrow Ta + Ti + HBr$	600 to 1200	1 atmosphere	1	3
Chromium-molybdenum alloy	.....	.....	.....	.....	4
	Carbides				
Carbon	$CCl_4 \xrightarrow{\Delta} C + Cl_2$	>1000(?)	50 mm	3	4
Boron carbide	$BCl_3 + H_2 + C_7H_8 \rightarrow B_4C + HCl + [CH]$	1200 to 2000	1 atmosphere	3	3
Silicon carbide α	$SiCl_4 + H_2 + C_7H_8 \rightarrow SiC + HCl + [CH]$ (a)	1300 to 2000	1 atmosphere	3	2
Silicon carbide β	$SiCl_4 + H_2 + C_7H_8 \rightarrow SiC + HCl + [CH]$	2000 to 2400	1 atmosphere	3	2
Titanium carbide	$TiCl_4 + H_2 + C_7H_8 \rightarrow TiC + HCl + [CH]$	1300 to 1700	1 atmosphere	3	3
Zirconium carbide	$ZrCl_4 + H_2 + C_7H_8 \rightarrow ZrC + HCl + [CH]$	1700 to 2400	1 atmosphere	3	3
Hafnium carbide	$HfCl_4 + H_2 + C_7H_8 \rightarrow HfC + HCl + [CH]$	2100 to 2500	1 atmosphere	3	3
Vanadium carbide	$VCl_4 + H_2 + C_7H_8 \rightarrow VC + HCl + [CH]$	1500 to 2000	1 atmosphere	3	.....
Niobium carbide	$Nb + H_2 + C_7H_8 \rightarrow NbC + H_2 + [CH]$	1300	1 atmosphere	2-3	3
Tantalum carbide	$Ta + H_2 + C_7H_8 \rightarrow TaC, Ta_2C, Ta_6C_5 + H_2 + [CH]$	1300 to 2900	1 atmosphere	2-3	3
Chromium carbide	$Cr + H_2 + CH_4 \rightarrow Cr_3C_2 + H_2 + [CH]$	600 to 800	1 atmosphere(?)	3	.....
Molybdenum carbide	$Mo + H_2 + CH_4 \rightarrow MoC + H_2 + [CH]$	700	1 atmosphere(?)	3	5
Molybdenum carbide	$Mo + H_2 + CH_4 \rightarrow Mo_2C + H_2 + [CH]$	800	1 atmosphere(?)	3	5
Molybdenum carbide	$Mo(CO)_6 + H_2 \xrightarrow{\Delta} Mo_2C + [C, H, O]$	300 to 800	0.1-3 mm	3	5
Tungsten carbide	$W + 3N_2 + 1H_2 + C_7H_8 \rightarrow WC + H_2 + N_2 + [CH]$	1000 to 2200	1 atmosphere	3	5
Tungsten carbide	$W + H_2 + C_7H_8 \rightarrow \alpha\ W_2C + H_2 + [CH]$	2100 to 2400	1 atmosphere	3	5
Tungsten carbide	$W + H_2 + C_7H_8 \rightarrow \beta\ W_2C + H_2 + [CH]$	2440 to 2550	1 atmosphere	3	5
Tungsten carbide	$W(CO)_6 + H_2 \xrightarrow{\Delta} W_2C + [C, H, O]$	300 to 800	<10 mm(?)	3	5
	Nitrides				
Boron nitride	$BCl_3 + N_2 + 1H_2 \rightarrow BN + HCl$	1200 to 2000	1 atmosphere	3	3
Titanium nitride	$TiCl_4 + 3N_2 + 1H_2 \rightarrow TiN + HCl$	1100 to 1700	1 atmosphere	3	3
Zirconium nitride	$ZrCl_4 + 3N_2 + 1H_2 \rightarrow ZrN + HCl$	1100 to 2700	1 atmosphere	3	3
Hafnium nitride	$HfCl_4 + 3N_2 + 1H_2 \rightarrow HfN + HCl$	1100 to 2700	1 atmosphere	3	.....
Vanadium nitride	$VCl_4 + 3N_2 + 1H_2 \rightarrow VN + HCl$	1100 to 1600	1 atmosphere	3	.....
Niobium nitride	$Nb + N_2 \rightarrow NbN$	1000	1 atmosphere	3	5
Tantalum nitride	$Ta + N_2 \rightarrow TaN$	1000	1 atmosphere	3	5
Tantalum carbide–tantalum nitride	$Ta + N_2 + C_7H_8 \rightarrow TaC + TaN + [C, H]$	1100 to 1200	1 atmosphere	2-3	3-5
	Borides				
Boron	$B_2H_6 \rightarrow B + H_2$	400 to 600	<20 mm	3	3
Boron	$BCl_3 + H_2 \rightarrow B + HCl$	800 to 1600	1 atmosphere	3	3
Aluminum boride	$AlCl_3 + BCl_3 + H_2 \rightarrow Al\ boride + HCl$	1000	1 atmosphere	3	3
Silicon boride	$SiCl_4 + BCl_3 + H_2 \rightarrow Si\ boride + HCl$	1100 to 1300	1 atmosphere	3	2-3
Titanium boride	$TiCl_4 + BCl_3 + H_2 \rightarrow Ti\ boride + HCl$	1000 to 1300	1 atmosphere	3	2-3
Zirconium boride	$ZrCl_4 + BCl_3 + H_2 \rightarrow Zr\ boride + HCl$	1700 to 2500	1 atmosphere	3	2-3
Hafnium boride	$HfCl_4 + BCl_3 + H_2 \rightarrow Hf\ boride + HCl$	1900 to 2700	1 atmosphere	3	.....
Vanadium boride	$VCl_4 + BCl_3 + H_2 \rightarrow V\ boride + HCl$	900 to 1300	1 atmosphere	3	3-4
Tantalum boride	$Ta + BCl_3 + H_2 \rightarrow Ta\ boride + HCl$	1800 to 2000	1 atmosphere	3	3
Chromium boride	$Cr + BCl_3 + H_2 \rightarrow Cr\ boride + HCl$	1200 to 1600	1 atmosphere	3	1-2
Molybdenum boride	$Mo + BCl_3 + H_2 \rightarrow Mo\ boride + HCl$	1800 to 2000	1 atmosphere	3	3
Tungsten boride	$W + BCl_3 + H_2 \rightarrow W\ boride + HCl$	1800 to 2000	1 atmosphere	3	3-4
	Silicides				
Silicon	$SiCl_4 + H_2 \rightarrow Si + HCl$	900 to 1400	1 atmosphere	3	3
Titanium silicide	$Ti + SiCl_4 + H_2 \rightarrow Ti\ silicide + HCl$	1100 to 1500	1 atmosphere	3	4
Zirconium silicide	$Zr + SiCl_4 + H_2 \rightarrow Zr\ silicide + HCl$	1100 to 1500	1 atmosphere	3	4
Niobium silicide	$Nb + SiCl_4 + H_2 \rightarrow Nb\ silicide + HCl$	1100 to 1800	1 atmosphere	2	4
Tantalum silicide	$Ta + SiCl_4 + H_2 \rightarrow Ta\ silicide + HCl$	1100 to 1800	1 atmosphere	1-2	3
Chromium silicide	$Cr + SiCl_4 + H_2 \rightarrow Cr\ silicide + HCl$	1100 to 1400	1 atmosphere	3	1-2
Molybdenum silicide	$Mo + SiCl_4 + H_2 \rightarrow Mo\ silicide + HCl$	1100 to 1800	1 atmosphere	2	1
Tungsten silicide	$W + SiCl_4 + H_2 \rightarrow W\ silicide + HCl$	1100 to 1800	1 atmosphere	.....	1-2
Chromium-molybdenum silicide	Cr on Mo $+ SiCl_4 + H_2 \rightarrow$ Cr-Mo silicide $+ HCl$	1100 to 1800	1 atmosphere	3	1-2

Deposit	Deposition Reaction	Deposition Temp., °C	Deposition Pressure	Ductility * of Coating	Oxidation † Resistance of Coating
		Oxides			
Aluminum oxide	$Al Cl_3 + CO_2 + H_2 \rightarrow Al_2 O_3 + CO + H Cl$	800 to 1000	1 atmosphere	3	1**
Silicon dioxide	$Si Cl_4 + CO_2 + H_2 \rightarrow Si O_2 + CO + H Cl$	600 to 1000	1 atmosphere	3	1
Silicon dioxide	$(C_2 H_5)_4 Si O_4 \xrightarrow{\Delta} [+ H_2 \text{ or } He] \rightarrow Si O_2 + [C, H, O]$	600 to 900	1 atmosphere	3	1
Zirconium oxide	$Zr Cl_4 + CO_2 + H_2 \rightarrow Zr O_2 + CO + H Cl$	800 to 1000	1 atmosphere	3	1**
Chromic oxide	$[C_5 H_7 O_2]_3 Cr \xrightarrow{\Delta} + CO_2 \rightarrow Cr_2 O_3 + [C, H, O]$	1000	1 atmosphere	3	1**
Aluminum oxide + zirconium oxide	$Al Cl_3 + Zr Cl_4 + CO_2 + H_2 \rightarrow Al_2 O_3 + Zr O_2 + CO + H Cl$	800 to 1000	1 atmosphere	3	1**

* Explanation of symbols used to describe ductility: 1 = Capable of being severely drawn, rolled, or otherwise worked without failure; 2 = Capable of withstanding slight deformation, or consisting of individually ductile crystals fragilely bound together; 3 = Incapable of being worked; of glass-like brittleness.

† Oxidation resistance: Classed according to the temperature range in which the rate of attack by air would cause severe erosion or failure of the coated specimen within a few hours. 1 = Above 1700 °C; 2 = 1400–1700 °C; 3 = 1100–1400 °C; 4 = 800–1100 °C; and 5 = 500–800 °C. The oxidation rate also depends upon other factors, such as coat thickness and rate of air flow past the specimen, which have not been taken into account here.

** The coating was too porous to prevent oxidation of the base, although not oxidized itself.

Solves coating problems (continued)

more difficult to obtain than uniform specimen temperature, especially on stationary samples. With nonturbulent flow at near-atmospheric pressures, the material tends to deposit in pronounced streamlines and on the windward side of objects.

Such lack of uniformity can be reduced or eliminated by rotating or inverting the specimen during plating or between consecutive plating periods. Proper baffling of the coating chamber to produce turbulent gas flow also helps. Operation at reduced pressure is sometimes useful in improving uniformity.

Another cause of non-uniform coatings is "edge effect." Deposition occurs faster at sharp corners, edges, and highly curved surfaces. In most cases, the excess material deposited at these points is not objectionable. However, it can be easily removed by grinding or machining. It can be avoided with rounded edges and corners.

Plating efficiency, as measured by the proportion of material deposited to material supplied as volatilized compound, varies greatly with the plating process and the conditions within any one process. Thermal decomposition in vacuum is the most efficient, but efficiencies as high as 80 pct have been observed in plating metals by hydrogen reduction of the halides. The oxide deposition processes are the most inefficient, frequently being less than 1 pct.

A wide variety of products and materials have been coated by vapor deposition. Adherent, nonporous deposits of all of the materials listed in the table have been obtained on one or more of the following: copper, nickel, iron, tantalum, molybdenum, tungsten, a variety of alloy steels, graphite, porcelain, quartz, alumina, pyrex and carbide compounds. Metals have been coated on nonmetals and vice versa.

In addition to wire, rod, tubing and strip, numerous articles such as pyrometer wells, die blocks, nozzles, crucibles, cyclotron and X-ray tube targets, and magnatron rings have been coated. Most of the work has been carried out as a batch process. However, refractory metals such as columbium, tantalum, molybdenum and tungsten have been coated on iron, copper, and molybdenum wires from 0.125 to 1.5 mm diam by a continuous-flow method.

Some of these coatings, along with carbides, nitrides, borides and certain high-melting metal silicides and oxides, should prove useful in preventing attack initiated at some point in a thin skin at a heated surface. A thin film of a high-melting material resistant to oxygen, nitrogen and water vapor offers protection for many applications of this type.

Specific examples of such applications might be combustion chamber linings, exhaust chamber linings, turbine blade coatings, valve linings and heat exchanger and regenerator elements.

The carbides, nitrides and especially the borides offer interesting possibilities for erosion-resistant coatings. Typical uses include linings for solid fuel injection nozzles, shot-blasting nozzles and bearing surfaces.

Potential applications are varied

Possible applications include nitride and boride superconductors for use in heat-sensitive elements of measuring or control instruments. Thin, small elements for thermocouples, resistance thermometers, bolometers could be made. Vacuum-tube and photo-tube elements of improved electrical or optical properties should prove satisfactory. Transparent, aspheric lens elements may be prepared by a process similar to the preparation of paraboloidal mirrors. This would involve metal evaporation through a rotating mask.

Large, transparent blocks or crystals of oxides such as SiO_2, ZrO_2, MgO, Al_2O_3, might be produced. Electrically conductive, porous coatings of high-melting, refractory metals are deposited on porous ceramic bodies. Tubes and sheets of hard, refractory materials are prepared by coating a removable core. Production of massive quantities of hard, refractory or highly pure materials have been shown to be feasible. Corrosion-resistant chemical ware is another application.

FIG. 1—Casting machine in operation. On the left, molten aluminum alloy flowing from the 20,000 lb holding furnace.

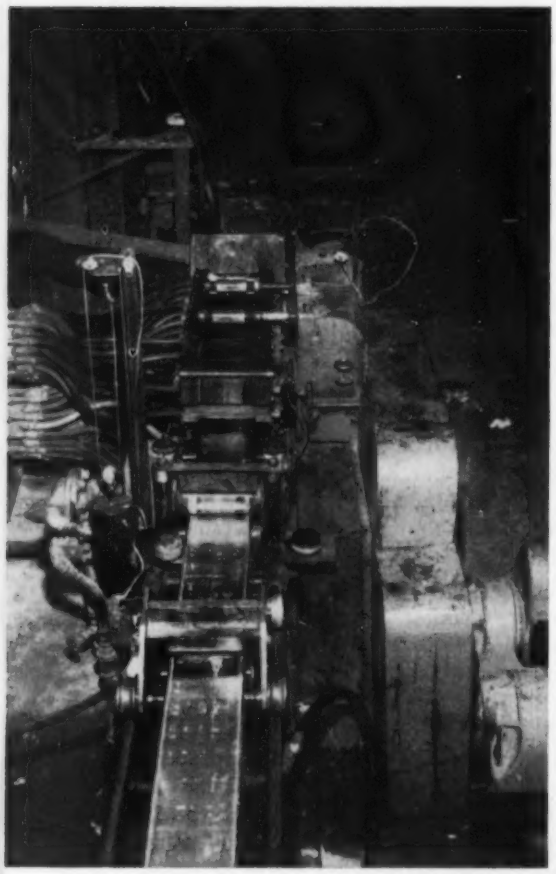


FIG. 2—Bar exit end of casting machine. Holding furnace and molten metal launders at top left. Guide rolls and flying shear in foreground. Casting speeds: 4 to 15 ft. per min.

FIG. 3—Cast bar entering oven. Oven holds the bar at proper rolling temperature until required bar length has been cast and cut with flying shear activated by microswitch.

Behind the venetian blind—

Aluminum strip rolled from CON

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Continuously cast aluminum bar 1 x 7 in., cut to 55 ft lengths, is hot-rolled into strip for venetian blinds without scalping or edge trimming at the Hunter Douglas Corp., Riverside, Calif. Casting speeds range from 4 to 15 ft per min depending on the alloy and geometry of the bar. Studies show a much wider bar may be cast on the Hunter Douglas machine. Three Ajax low frequency induction furnaces melt metal for the casting machine at up to 6000 lb per hr. Metal is held in two 20,000 lb gas fired reverberatory furnaces.

A machine for continuously casting aluminum and its alloys into horizontal bars 55 ft in length or longer has been perfected and used on a daily production basis for nearly 2 yr.

The Hunter Douglas casting machine, Figs. 1, 2, produces cast bars that are subsequently hot-rolled to strip without scalping or edge trimming. Surface and edge quality is of such order that scarfing operations considered normal in

om CONTINUOUSLY CAST BAR

the aluminum wrought industry are not necessary. Metallurgical soundness and uniformity are at least equivalent to commercial material.

The equipment in operation at the Riverside, Calif., plant of the Hunter Douglas Corp. was designed and developed to produce a strip 7 in. wide. Experimental studies indicate greatly increased widths are practicable. Casting speeds range from 4 to 15 ft per min depending upon alloy composition and geometry of the bar.

Current production is confined to 1 x 7 in. bar. As shown in Fig. 3, the cast bar is guided into the horizontal oven to heat or cool the bar to the desired hot-rolling temperature. When 55 ft have been cast, a microswitch activates a flying shear in front of the casting machine which cuts the bar.

Bar rolled into oven

The sheared bar is mechanically rolled into the oven, moved sideward out of the way of the new bar being cast, and conveyed by pinch rolls, Fig. 4, to the hot mill, Fig. 5. This 6-stand tandem mill processes the 1-in. thick bar into a 450-lb coil of ⅛-in. thick strip, in about 1 min. Few edge cracks are experienced despite the absence of edge rolling and the use of an unmachined bar.

The casting machine has been producing on a daily basis for almost 2 yr. In that time over 25 million lb of aluminum and its alloys have been cast and hot rolled. Most of this production has been cold-rolled into venetian blind coil stock, Fig. 6, where gages range from 0.0075 to 0.0092 in. The final cold reduction from the hot rolled 0.125-in. gage to the finished strip gage are made in a high speed 6-stand tandem mill without intermediate anneals.

Soft alloys, or compositions not prone to coring or other metallurgical segregation, may be rolled immediately after the bar is cast. Special heat treatable alloys developed at Hunter Douglas for high strength strip applications do not require a homogenization heat treatment for satisfactory hot-rolling. Commonly used high strength, high alloy content compositions might require the usual soaking heat treatment to improve rolling characteristics by eliminating coring, alloy segregation, and by spheroidizing insoluble intermetallic compounds.

Since the machine was designed to operate on a continuous basis, a constant reservoir of alu-

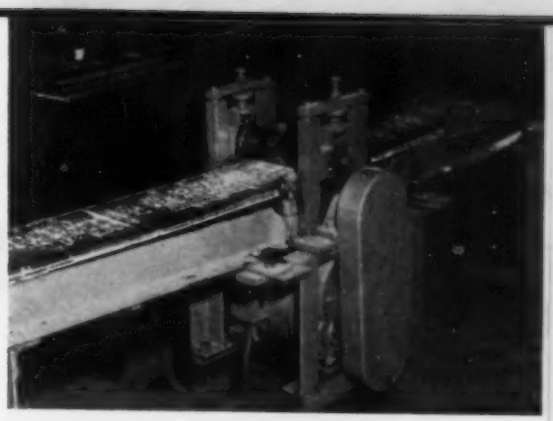


FIG. 4—Cast bar leaving oven on way to hot-rolling mill. Pinch rolls propel hot bar along conveyer.

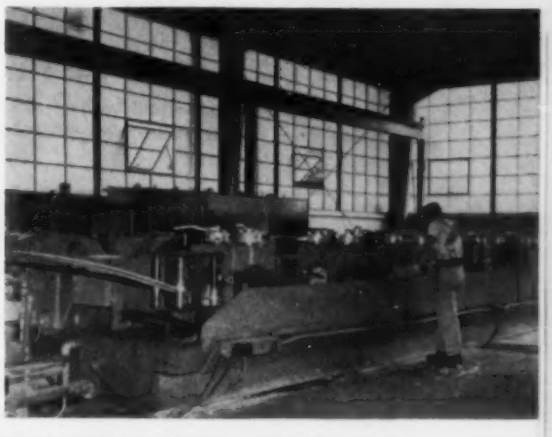


FIG. 5—Continuously cast bar shown entering hot mill at left. Coil of ⅛-in. thick strip is shown forming at right. The 6-stand tandem mill was designed and built by the Hunter Douglas Corp. Edges do not have to be rolled.

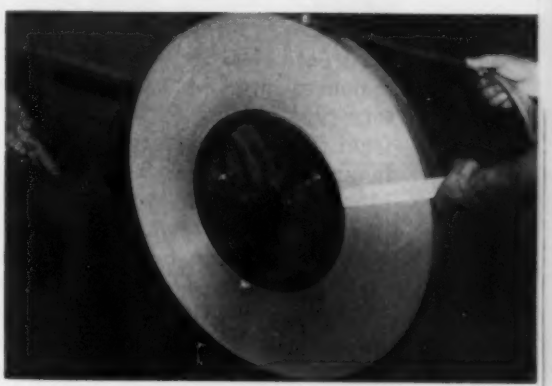
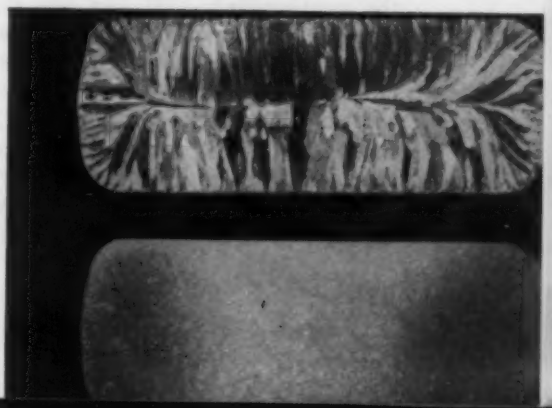


FIG. 6—Finished cold-rolled coiled strip 2 in. wide x 0.008 in. thick is reduced in 8-stand tandem mill from 0.125 in. without intermediate anneal.

FIG. 7—Structure of continuously cast bar 2½ in. x 1 in. thick. Alloy without grain refiner, top, coarse columnar grains. Alloy with 0.03 pct Ti, bottom, shows fine grain. Both bars show sound cross section.



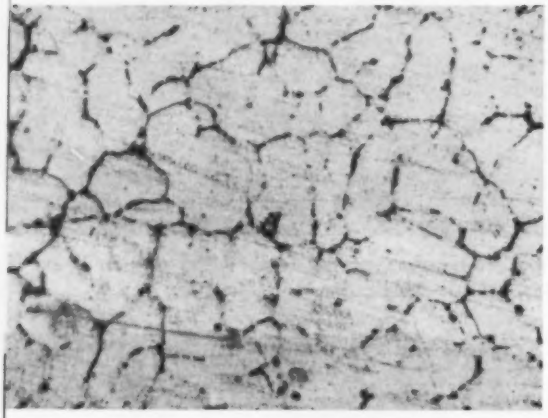


FIG. 8—Microstructure of continuously cast HD11 alloy bar. Etching shows fine dendritic structure. 140 X.

ALLOYING MATERIALS USED

	Magnesium	Manganese	Copper	Silicon
HD-10	0.8	0.6	0.6	.....
HD-11	1.0	0.6	0.6	0.6

minum must be provided. This requirement is met by a battery of three Ajax low frequency induction furnaces which melts and alloys a maximum of 6000 lb of metal per hour.

As each electric furnace completes its cycle it is poured into two 20,000 lb gas fired reverberatory type holding furnaces. Metal is laundered from the reverberatory to the casting machine in an open trough. A constant level and unbroken liquid metal surface is assured by means of an adjustable tap hole valve controlled by the machine operator. Several machines can be attached to a single holding furnace if needed.

Metal enters the casting machine through a specially designed tip and flows into the cavity formed by halves of the moving chain. The chain consists of heat treated cast iron blocks, drilled for water cooling. The blocks are closely machined to a precision fit, producing a smooth mold cavity in which the aluminum solidifies. The solid, hot aluminum bar exits at temperatures ranging from 750° to 1000°F depending upon the chain speed and the mass of the bar.

The excellent hot-rolling characteristics of the continuously cast bar are related to the soundness attained from the pronounced directional solidification possible in the casting machine. The surface temperature of the water cooled chain blocks is about 100°F when contact is made with the molten metal. The resultant solidification gradient is so great that continuous feeding from the molten metal heat at the tip can be achieved.

In some compositions having not grain refining additions the steep thermal gradient during solidification is evidenced by the columnar structure of the bar. When 0.03 pct Ti is added to the same material, a fine grained, equiaxed structure results, Fig. 7.

Many micro and macrostructural studies were made of the cast bar during development of special wrought alloys currently in use. The results of one study involving mechanical propetries will serve to demonstrate the high metallurgical quality of the continuously cast bar. From a single length of HD11 alloy bar, 7 in. wide x 1 in. thick, several standard ½-in. diam tensile bars were machined. The balance of the same bar was hot-rolled to 0.125 in. thick as in daily production practice. Specimens were machined from the strip and all tensile coupons were solution heat treated at 1020°F, quenched,

PHYSICAL PROPERTIES OF HD11 COMPARED

	Continuously Cast	Hot-Rolled
Tensile strength, psi	51,000	53,000
Yield strength, psi (0.2 pct offset)	42,000	42,000
Elongation in 2 in.	18 pct	14 pct

and aged 4 hr at 350°F. Average results are shown in the Table.

The relatively small difference in properties between the continuously cast hot-worked material is apparent. The fine internal structure of the cast bars tested is shown in the photomicrograph, Fig. 8. Excellent cast properties result from this structure.

Until current aluminum restrictions were imposed, two machines were casting bar at a daily rate of 70,000 to 80,000 lb for hot-rolling. Commercial compositions that have been satisfactorily cast and hot-worked to date are 2S, 3S, 4S, 52S, 61S, and 24S. Most of the tonnage, however, has consisted of two alloys specifically developed by Hunter Douglas for high strength venetian blind applications. One alloy develops "as rolled" properties ranging between 52S and 56S, while the other alloy produces heat treated properties comparable to heat treated 24S.

Development is under way to adapt the machine to manufacturing requirements of large consumers of aluminum wrought products who envision in this machine a lower cost, more efficient technique for bridging the usual gap between liquid alloy and the shape required for hot and cold fabricating processes. These companies will use the machine under a license agreement with Hunter Douglas.

Patents are pending covering the design of the casting machine described.

WATER SPRAYS:

How effective can they be?

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and

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Temperature differential and quantity of fluid flow rather than droplet size control heat exchange, a study of water sprays indicates. Effects of pressure, nozzle size, flow and droplet size on cooling rates were studied at the University of California. Specimens of 70-30 brass, heated to 1000°F in an electric furnace, were quenched. Pressures in the circulating closed system varied from 0 to 100 psig at an output of 90 gpm. Cooling curves were automatically recorded.

Quantitative information as to cooling rates of water sprays, widely used in quenching operations, is not readily available in published literature. This lack of information prompted the following study of effects of pressure, nozzle size, quantity of flow and droplet size on the cooling rates of water sprays.

The testing system shown in schematic layout in Fig. 1 is pictured as a unit in Fig. 2. The spray chamber, a rectangular unit 12x15x17 in., has glass windows on two sides. The chamber contains six spray nozzles arranged in a circular pattern on a horizontal plane. Each nozzle had a 50° spray angle insuring a uniform spray pattern. Nozzle sizes were 0.0313, 0.0400, 0.0700,

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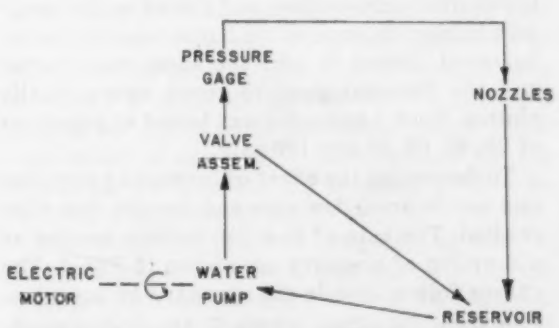
0.0935, 0.1094, and 0.1250 in. diam orifices. The specimen holder, Fig. 3, was a stainless steel rod with a ceramic insert to insulate the chromel-alumel thermocouple wires.

Specimens of 70-30 brass 1 in. in diam and 3 in. long were mounted as shown in Fig. 3 in order to measure the center temperature. A potentiometer automatically recorded cooling curves.

A positive displacement pump with a 5-hp electric motor provided pressures from 0 to 100 psig at an output of approximately 90 gpm. Excess water was returned from the spray chamber to the reservoir and the system operated as a circulating closed unit. Temperature of the circulating water, due to the large quan-



SCHEMATIC DIAGRAM OF THE SYSTEM

FIG. 1—Schematic layout of the testing system, a circulating closed unit, is shown above.

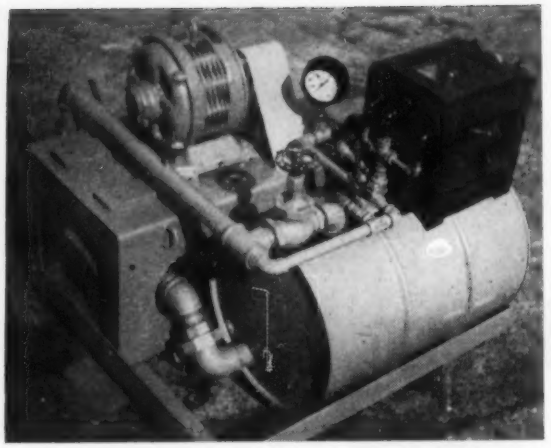


FIG. 2—Windows permit observation, high speed photographing of spray test. A positive displacement pump and 5-hp motor supplied pressures to 100 psig at about 90 gpm.

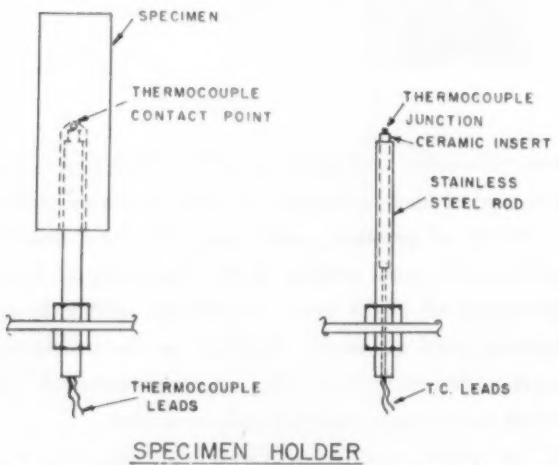


FIG. 3—Specimens of 70-30 brass were mounted on a holder combining a stainles steel rod and ceramic insert.

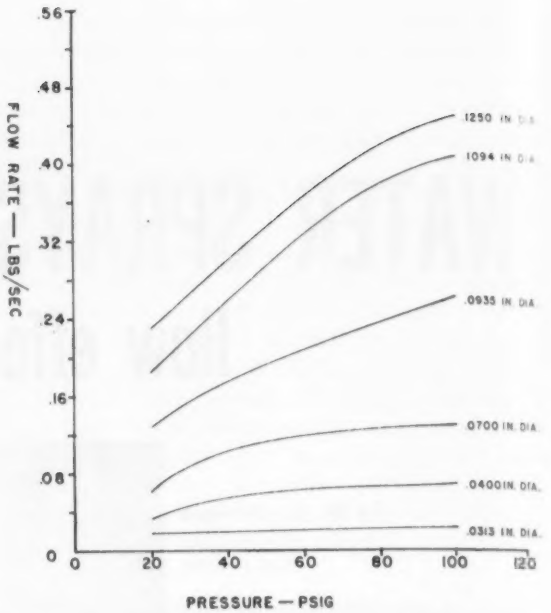


FIG. 4—Flow rates for several nozzle sizes are shown as a function of pressure.

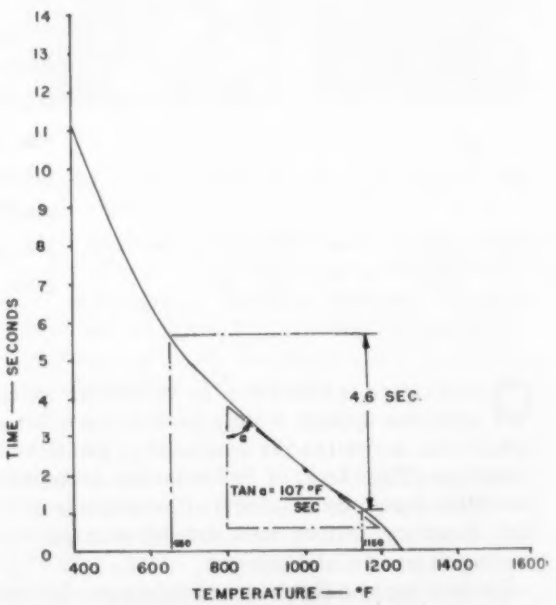


FIG. 5—A typical time-temperature cooling curve is shown. Nozzle diameter is 0.0313 in., pressure 100 psig. Furnace temperature was held to ± 10°F.

Watersprays (continued)

tity of excess water, remained essentially constant throughout the test.

Specimens were heated in an electric furnace to required temperature and placed on the specimen holder. As soon as the temperature recorder balanced (about ½ sec) the spray was started and the time-temperature curve automatically plotted. Each nozzle size was tested at pressures of 20, 40, 60, 80 and 100 psig.

To determine the effect of increasing pressure and nozzle area, flow rate and droplet size were studied. The rate of flow for various nozzles as a function of pressure are shown in Fig. 4. The curves follow closely the standard orifice equation $Q = CA\sqrt{2gh}$, where C, the orifice coefficient, varies from 0.3 to 1.0.

High speed photographs were made of the water sprays for various pressures and nozzle sizes. Droplet size was determined using an optical comparator. The results showed only a slight change in the mean diameter of the droplets. Analysis indicates, in this case, that the criterion for heat exchange is temperature differential and quantity of fluid flow and not droplet size.

Severity of quench depends on the rate of heat transfer from the surface of the specimen. This rate depends on the temperature differential between the surface and center of the specimen. Results were expressed in two forms. In the first, the time involved in cooling the specimen from 1150° to 650°F was measured directly from the time-temperature curves. In the second, the cooling rate at 1000°F was determined

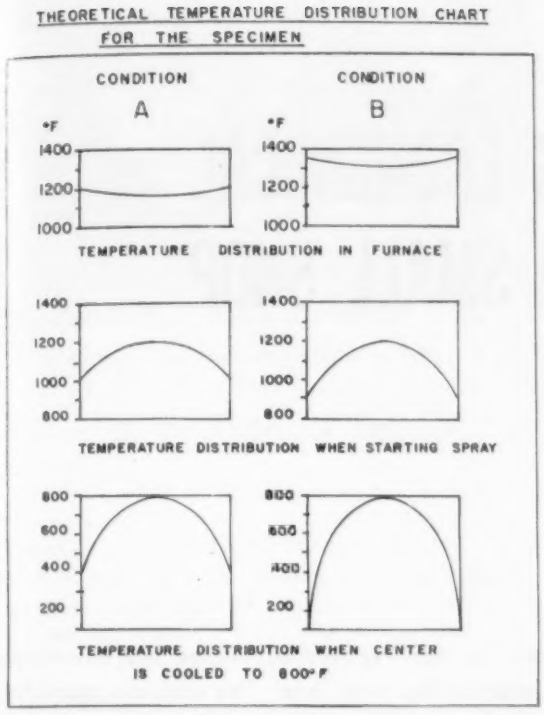


FIG. 6—The center temperature as shown above, could be identical in cases A and B with the outside temperature varying as much as 300°F.

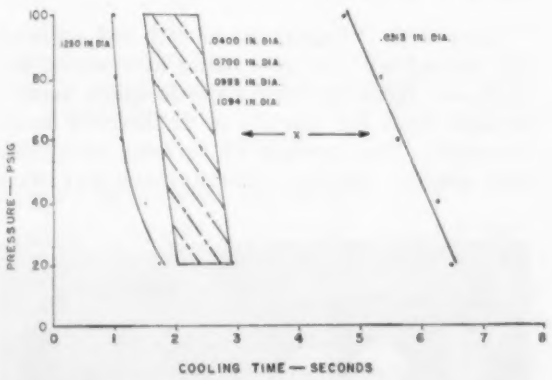


FIG. 7—Effect of pressure on cooling time required for a 500°F temperature drop is shown above.

by measuring the slope of the curve at this temperature.

A typical time-temperature cooling curve Fig. 5 shows the method used for interpreting the data from the curve. The furnace temperature was controlled to ±10°F to eliminate error due to changing temperature distribution within the specimen. The center temperature, point of contact of the thermocouple, could be identical in both cases A and B Fig. 6 with the outside temperature varying as much as 300°F. This changes the slope of the curve and gives non-reproducible results.

The effect of pressure on the cooling time required for 500°F temperature drop is shown in Fig. 7. Curves for the 0.0400, 0.0700, 0.0935

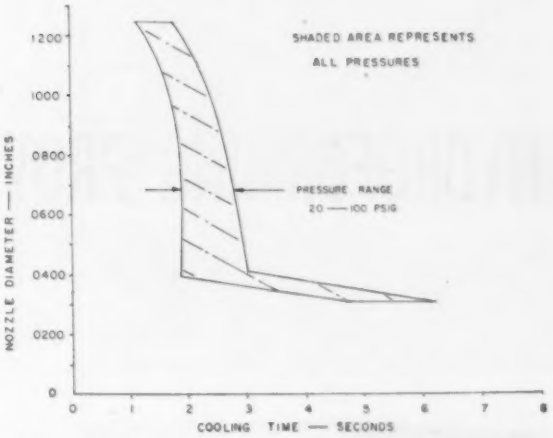


FIG. 8—Relationship between cooling time and nozzle size is shown for pressures ranging from 20 to 100 psig.

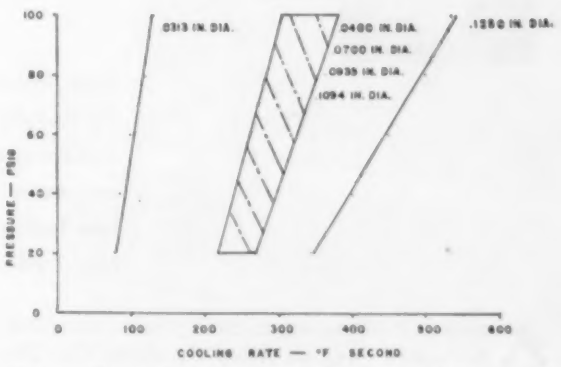


FIG. 9—The cooling rate at 1000°F is plotted for several nozzle sizes in relation to pressure.

and 0.1094 in. diam nozzles were so closely related that a blanket result was assumed and is represented by the shaded area of the graph. The 0.0313 and 0.1250 in. diam nozzles showed considerable difference in cooling time required for the same temperature differential. The section marked "X" is the unexplored region where further research is being made.

A relationship between cooling rate and nozzle size is shown in Fig. 8. The cooling rate is essentially constant for nozzle diameters of 0.040 to 0.100 in. For nozzle diameters less than 0.040 in. a large change in the cooling rate occurs for small differentials in nozzle sizes. The effect of pressure is insignificant for the 0.1250 in. diam nozzle but becomes greater as the nozzle size diminishes.

Fig. 9 represents the cooling rate at 1000°F. It was again necessary to plot the data for the 0.0400, 0.0700, 0.0935, and 0.1094 in. diam nozzles to show a definite difference in cooling rate at 1000°F. It is believed the cooling rate at some specified temperature could be controlled by investigating nozzle sizes in the unexplored region.

The authors are indebted to W. J. Caress, E. Clara, A. A. Cree, C. E. Manes, and R. Peterson for assistance with the project.

HYDROFORMING PROVES ECONOMICAL IN SMALL SHOP

By Rhodes Danehower
Partner
Alloy Products Co.
Marion, Ind.

Press forming with the new Hydroform machine has advantages particularly important to the small shop. This company specializes in development work, which means short runs and frequent design and material changes. The advantages it finds in Hydroforming: Low tool cost, less time for tooling, number of required operations often reduced, greater versatility.

A new press forming method has proved ideal for short runs at Alloy Products Co. The Hydroform machine, developed by Cincinnati Milling Machine Co., has been found by Alloy Products to lower tooling cost, shorten time between release of drawings and completion of samples, reduce required number of operations on many parts, and to increase its plant's versatility.

Alloy Products has had its Hydroform in operation since July, 1951, on development and experimental work. Several different alloys have been successfully drawn including Inconel, L-605, aluminum, stainless steel, stainless-clad copper, brass, and aluminized steel.

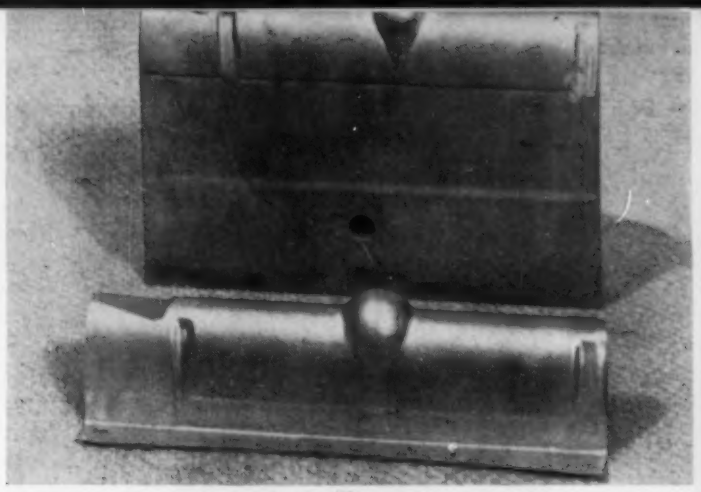
Alloy Products Company is a development shop, primarily interested in producing parts for experimental jet aircraft, usually in small quantities. Naturally, engineering changes are frequently made in parts of this type. So it is very important that tool costs be held at a minimum, until the part is finally accepted for production.

Hydroforming is an entirely new forming method, introduced in 1951. A flexible diaphragm sealed against high pressure, backed by hydraulic oil, is the unique feature of the machine. This feature eliminates much of the conventional tooling needed for forming, drawing, or embossing. Hydroforming provides a wide range of pressures, applied to all surfaces of the work, gently and evenly without harm to the surface of the formed part.

Parts with lithographed or finished surfaces are formed without scratching or marring the surfaces. Hydroforming accords quick service because tools for parts can be literally made overnight. This process of forming maintains high quality, forming parts uniform and exact

FIG. 1—The Hydroform press at Alloy Products Co.

FIG. 2—Dome drawn from Inconel, 0.060 in. thick.



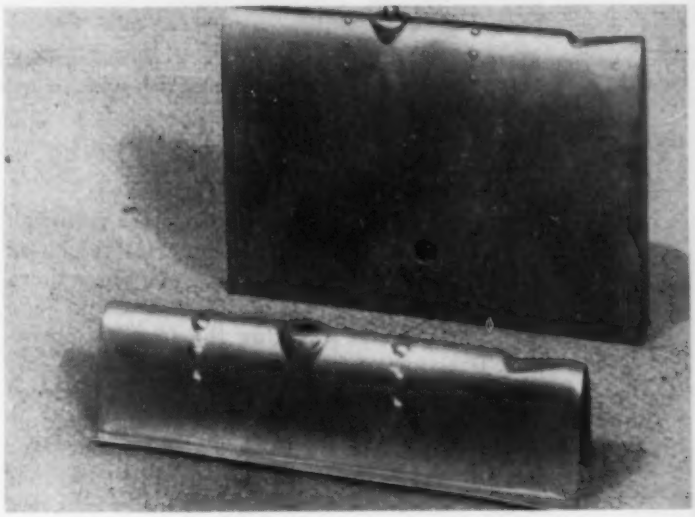


FIG. 3—Mating parts formed from 61 SO aluminum, with the punches used in production of the parts.

by preserving the mechanical properties of the material.

Hydroforming eliminates the punch and die combination; only one tool is employed in an operation. This reduces the die cost by more than 50 pct. Die wear is also eliminated due to the lack of abrasive action, since the part to be formed is literally wrapped down over the punch. In this method of forming, all of the trial-and-error lining up of dies, adjusting, and shimming are eliminated. Because there is only one die involved, it can be set up and ready for operation in much less time than is required to set up conventional dies.

Since this method is a hydraulic process, most shapes can be made in one operation. Side embossing and offsets do not require the usual second-operation tool or side action mechanism. The combination of a flexible die member backed by oil makes possible the forming of many intricate shapes in one operation.

Process overcomes springback

Another feature is the ability of this process to overcome springback. In other types of forming, dies have to be developed to counteract springback, but in Hydroforming the shaping takes place with the material more or less in the plastic range. When the part is removed from the machine, the formed part needs little or no hand operation to give it its final shape, Fig. 1.

Standard forming methods require additional material for grip and displacement, as the blank is compressed or stretched. In this method, however, the hydraulic pressure is evenly distributed over the surface of the material with smaller blanks and less trimoff after forming. Changing from one kind of material to another does not effect the tooling as it would in conventional tools. The machine will accommodate a change from aluminum to stainless steel or carbon steel or brass with only readjustment of the working pressure to suit the physical properties of the material involved.

Since the surface of the material is gently and firmly held, surface finishes are not marred or injured. Parts can be formed after material is painted, plated or highly polished. The part being formed can be examined during any stage

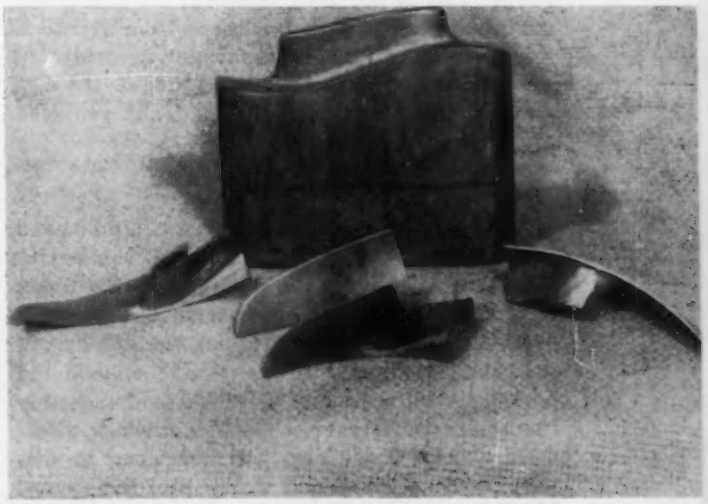
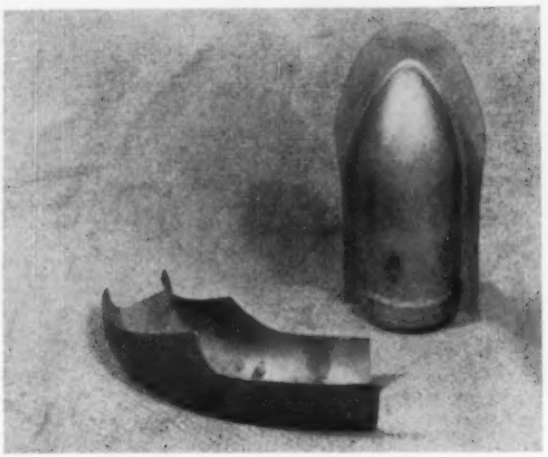


FIG. 4—Intricate shapes made with Kirksite punches. Parts at left and right are made together by punch in background, sawed and trimmed, then welded together to form the completed part shown in the center.

of the operation. This is of great value during job development. It shortens development because the metal can be observed at the time it yields, and corrections in the developed size can



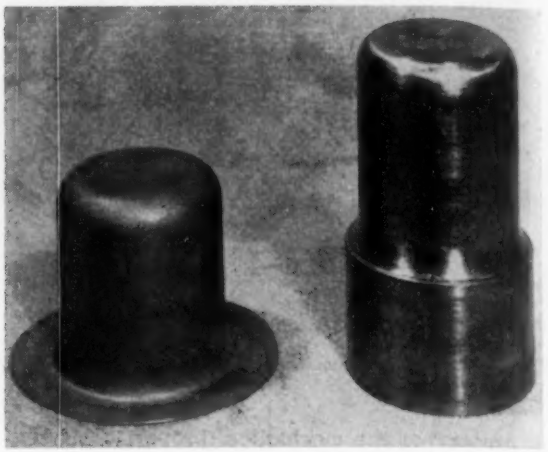


FIG. 5—Part at left is drawn with flange side smaller than upper section, using segmented punch. Can at right has draw depth equal to 1½ times diameter. Material is Inconel. Height is held within 0.010 in.

Hydroforming in small shop (continued)

be made immediately. This also saves material.

Commercial variation in material thickness from lot to lot presents no problem. Since there is no matching punch and die, the material gage can vary without affecting the forming operation. Drawing pressures can be adjusted to suit changes in gage. Because of the simplicity of operations, no particular skill is demanded of the operator. After a short training period devoted to the installation of dies and operation of the pressure controls, any operator of average mechanical ability can operate this press.

The Hydroforming process differs from other rubber pad forming methods in that a solid rubber pad is not used. Instead, the press ram contains a cavity closed at the bottom by a flexible diaphragm. This diaphragm is protected against wear by a rubber pad glued to the diaphragm which can be pulled out and replaced quickly and inexpensively.

Tooling simple, inexpensive

In operation, the machine is closed and locked with holding pressure built up in the ram cavity by means of a hydraulic pump. With the blank thus held, the punch is moved up by hydraulic pressure into the cavity, forcing the diaphragm pad and the blank to take the shape of the punch. Initial pressure up to 8000 psi is possible in the cavity. Higher pressures, up to a maximum of 15,000 psi, are then developed by displacement as the punch moves into the cavity. Maximum depth of the draw on the 12-in. machine is about 7 in.

As compared with conventional tooling, the Hydroform tooling is simple and inexpensive. All that is required for each drawing operation is a punch of the desired shape and size, and a nest ring. This ring has a hole of the same shape as the punch with enough clearance so the punch moves easily through the hole. It is advisable that the nest ring have a good finish all

FIG. 6—T assembly made with cast Kirksite punch, right.

over the top face, as tool marks tend to hold the blank. The punch may be machined out of ordinary steel, hardened and ground. Good finish is required because any imperfection or tool mark in the punch will be reproduced in the drawn part.

Kirksite, brass, and wood punches have been used for short runs, simple draws, and forms. Alloy Products Co. has used Kirksite very successfully for punches where it is necessary to hold costs down in irregular shapes and forms in contrast to expensive tracing or shaping operations.

The nest ring is usually plain steel, but if the draw is difficult, tool steel is used. On jobs of long duration, a ring of low carbon steel is used with an insert of tool steel containing the opening for the punch. In some cases a form is machined in the nest ring to give the flange of the drawn part the shape desired.

Occasionally, it is impossible to exert enough pressure in the ram cavity to sharpen up the radius between the flange and the wall of the drawn part. This can be overcome by one of two methods. The first is a feature built into the machine making it possible to retract the punch any given distance after the completed draw, but before releasing the cavity pressure. This has the same effect as restriking in a conventional die. In other words, it lets the part settle down and sharpen the radius.

The other method is to machine a ring to fit

the outside of metal of the drawn part, with the desired radius on the inner bore. At the completion of the draw, but before retracting the punch, pressure is released and the ring placed over the drawn part. The cavity is then recharged and due to the increased area of the ring the radius is sharpened.

With the Hydroform process, parts can be formed with the bottom or flange end of the part smaller than the upper end. Of course, it is necessary to have a segmented punch in this case in order to remove the punch from the part after forming.

Draws of average depth can be made with a time cycle of about 30 sec between placing the blank and removing the drawn part. After placing the blank, the ram is lowered and locked. Then charging pressure is applied. Next a lever is thrown which starts the punch moving upward. When the punch reaches a preset height, it automatically disengages. Pressure is then released from the cavity and the head returned to its upper position. The punch is then retracted and the part removed.

Blanks should be circular

If at all possible, blanks should be circular in shape, and should be thoroughly cleaned. The drawing compound is then spread thinly and evenly over the bottom side of the blank. Burrs and sharp edges are usually removed from the blank before forming.

Fig. 2 shows a dome made of Inconel 0.060 in. thick, used on combustion liners. In the background is the punch used to form this part. If this part were drawn on conventional tools, it would be necessary to take two or more draws. There is usually a tendency to leave marks where one draw leaves off and another one starts. This is undesirable in a part of this type due to the high temperature used in the complete assembly. Spinning is also objectionable for the same reason. There are no marks of any kind on the part as drawn on the Hydroform. Tooling cost on this job is approximately $250.

Since metal cutting usually is not done on the Hydroform, parts of this type are trimmed by conventional methods. Domes of this type are made from various alloys, and in a number of shapes and sizes. This is a good example of frequent engineering changes where low tool cost is important.

The parts shown in Fig. 3 were formed from 0.032-in. aluminum type 61 SO. The part at the top fits into the outer shell shown below. The smaller dome on top of the left part presents a problem due to the necessity of controlling reduction of material. The necessity of having a large blank for this part makes it imperative that material be drawn evenly in the immediate vicinity of the dome in order that the material in the top of the dome is not excessively reduced in thickness. The small dimples along the curved surface of the duct at the right are formed by small projections on the punch. If these parts were made on conventional tools it would be necessary to incorporate three or more separate operations.

Parts, sawed, welded

Fig. 4 shows the kind of punches that can be made of Kirksite. The parts on the extreme left and the extreme right are formed at the same time, then trimmed on a saw fixture. These parts are then welded together to form the part in the center. The nest ring in this case was also made of Kirksite and shaped so that when the punch was in an up position the contour of the flange section of the punch blended into the contour of the nest ring.

This throat assembly fits into the part shown at the extreme left in Fig. 5. Here is shown the ability to draw parts with the flange side smaller than the upper part. The part after forming is stripped off the punch.

In the center of Fig. 5 is illustrated a bullet-shaped piece made in two parts with the two halves identical so only one set of tooling is required. An untrimmed half is shown. The cost of tooling for this part is approximately $185. At the right is shown a can where the depth of draw is 1½ times as great as the diameter. In the background is the punch used for this part. The material used is Inconel. Tooling costs are approximately $165. This part is held within ±0.010 in. in height.

Fig. 6 is one side of a T assembly. The punch, shown at the right, is made of Kirksite. It is apparent that a sizable reduction in tooling cost results from being able to cast the punch instead of machining it out of steel. Conventional tooling for this part would be expensive, and since the total pieces required was only 25 the unit price could be very very low compared to other methods of manufacture.

NEW BOOKS

"Give Me an Old Fashioned Breakfast," by Red Sutherland. This little booklet deals with the swing away from hearty breakfasts, and the morning break for coffee, each of increasing concern to industry. Economics Press, Montclair, N. J. Prices start from 20¢ each in quantities of 25. 12 p.

"Titanium Metal and Its Future," is a thorough analysis of the metal's future. Risks v. growth posibilities are evaluated and titanium as a competitor to aluminum and stainless steel is assessed. Harvard University, Graduate School of Business Administration, 192 Upland Road, Cambridge, Mass. $10.00. 100 p.

MACHINE TOOL FORUM LOOKS AT FUTURE

Things to come in machine tool design and machining practice occupied the center of the stage at last week's machine tool electrification forum. One paper introduced a new contour-copy milling machine guided from a paper pattern by an optical sensor. Another revealed trends in machine design and machining practice being brought about by use of hard-to-machine jet engine alloys. In a look into the more distant future, the forum was told of a milling machine guided by information punched in a paper tape.

Looks into equipment and methods of the near future and the more distant future were given engineers attending the 16th annual Westinghouse Machine Tool Forum in Buffalo last week.

Two of the papers presented were concerned with the immediate future. One describing the trend in machines and methods for machining jet alloys, and the other introduced a new copy-contour milling machine. Regarding the more distant future, a machine now in laboratory use controlled by information supplied on punched tape was described.

Several interesting points regarding future practice and equipment for machining jet engine alloys were brought out in a paper by P. G. DeHuff and D. C. Goldberg, Westinghouse Electric Corp. The future potential for use of liquid carbon dioxide as a coolant is high, they feel. It has proved very useful in much of their work, particularly with titanium. In fact, in their experience, broaching of titanium compressor discs is impossible without use of this coolant material.

A detailed report on use of carbon dioxide and other aids to machining of titanium developed at Westinghouse will appear in the April 17, 1952, issue of The Iron Age.

In the realm of machine design for jet alloy machining, the authors recommended higher horsepower. Engine lathes with 20-hp motors barely handle the roughing cuts required, they said. Vertical turret lathes with 30-hp drives are better. But the authors said the trend will be toward use of at least 50 hp on these machines if roughing work is to be done in the quantity and at the speeds which are necessary.

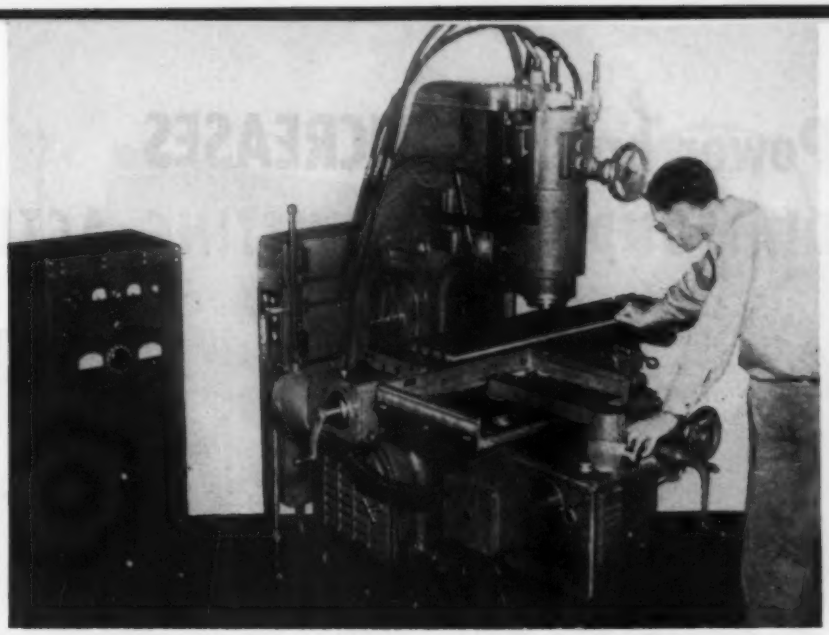
Since the size of jet engines is growing, in the near future a majority of today's engine lathes will not be usable for jet compressor discs. Lathes with a 60-in. swing will be required. Right angle lathes now being made have suitable swing for these discs on finishing cuts, but are needed in greater quantity.

More use of variable speed drives is also necessary, the authors find. The optimum surface speed range for jet alloys is narrow. To keep surface speed across disc faces within this range requires speed changes starting at very low speeds. Many current machines are not sufficiently versatile in this respect. Volume production of automatic contour machining devices is another need. Automatic chip disposal methods and faster but more rigid methods of clamping are other developments the near future will require.

An automatic knee-type contour-copy milling machine guided by an optical sensing device was described by T. A. Wetzel, Kearney & Trecker Corp. The optical system follows a negative pattern made from opaque paper or similar material.

The machine was designed to have high accuracy at greater production rates, to be particularly useful in the machining of non-ferrous materials. Standard milling machine features were made available, though it is not recommended that the machines be subjected to heavy duty work normally done on standard milling machines.

One model of the new machine has available high-cycle spindle speeds and feed rates as high as 100 ipm. Optical sensing equipment uses an auxiliary table built into the machine at the left front of the work table. On this the paper pat-



CONTOUR-COPY milling machine developed by Kearney & Trecker Corp. It is automatically guided by an optical device following an opaque paper pattern. Pattern table and "light funnel" arm are at left of operator's left hand.

terns are mounted. As the pattern table moves, the pattern is carried under a light tunnel, or arm, which follows the edge of the pattern and originates control information to guide the machine.

Electronic control is located in a cabinet separate from the machine. Electronics are used solely for providing very sensitive quick-acting switches. Four tubes, North, South, East, and West, provide switching translator action to cause respective currents to flow to the table drive motors.

Another type of machine control was described by W. M. Pease, Massachusetts Institute of Technology. In an MIT laboratory, a Cincinnati Hydrotel has been fitted with equipment for controlling it by means of information punched on paper tape. The Hydrotel control features of the machine have been removed for this work.

Four types of information are supplied by means of the tape: Motion instructions in each of three directions, and time. This is provided by groups or blocks of holes punched in the tape using the binary system of notation.

As the tape is read by the sensing device, pulses of information are sent to storage banks. Some holes in the tape determine the nature of the information. Others determine the time. The rate of the pulses determines the feed rate for the particular operation the machine is instructed to perform. The quantity of pulses sent determines the total motion in that time, or in other words, the length of the cut.

Although the tape is read intermittently from the point of view of any one of the four functions, the storage banks feed the information to the machine so as to permit continuous operation.

Corridor conversation following delivery of this paper indicated that most of the machine tool experts believe use of such machine tool control in actual production is many years away yet, although most were impressed with the potentialities of the system. Professor Pease, however, gave an indication of the advanced state of development by displaying a photograph of a fairly complex forging now in actual production. The MIT milling machine can do the required milling on this part in one-third the time required by the conventional milling equipment now being used, he said.

Much interest at the Forum was centered on the report of the National Machine Tool Builders' Assn. Electrical Committee. Proposed code revisions and problems in meeting the strict code requirements of the City of Los Angeles were the main points in discussion of this committee's work in the past year. Recommendations for code revisions have been submitted by the committee. Consultations have been held with California officials, and a petition for temporary relief during the defense emergency from certain code provisions has been made to the Los Angeles City Council.

Among other papers presented at the Forum were "Operating Characteristics of Driving Elements in Regulated Systems," by W. O. Osbon, Westinghouse Electric Corp., and "Machine Tool Control Transformer Selection," by R. E. Johnson, Barber Colman Co. "Application of Thermal Relays for Motor Protection" was discussed by D. L. Pierce of Westinghouse, and "Power Supplies for Adjustable Speed Drives" by Dr. L. P. Winsor, Rensselaer Polytechnic Institute.

A paper on magnetic amplifiers was read by R. W. Moore, of Westinghouse. Reports on the current machine tool situation were given by Tell Berna, general manager of the National Machine Tool Builders' Assn. and in a luncheon address by F. S. Blackall, Jr., president of Taft-Peirce Mfg. Co. and president of the NMTBA. (THE IRON AGE, April 3, p. 118.)

Attendance at the Forum totaled over 400 representing 133 machine tool builders and users, 16 technical magazines, and 5 government agencies.

Power brushing INCREASES
DIAMOND WHEEL CUTTING ACTION 80 PCT

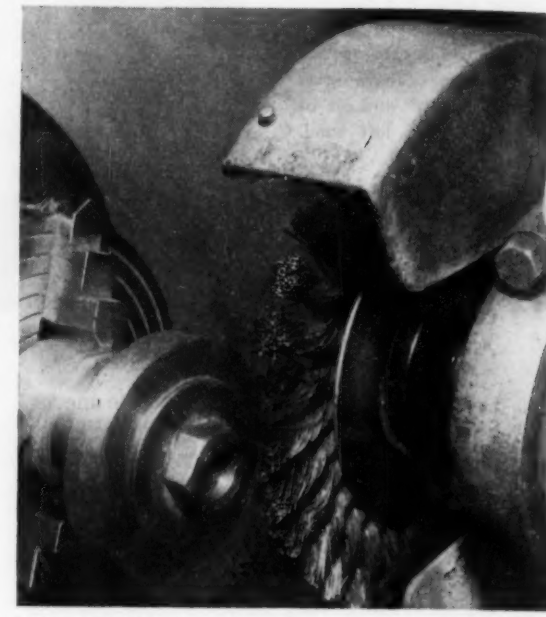
A new brushing method that increases the cutting action of used diamond wheels by 80 pct is now in use at the S. K. Wellman Co., Cleveland, Ohio.

This method, worked out by Wellman Engineers in collaboration with the Osborn Mfg. Co., Cleveland, utilizes a wire brush to remove some of the brass matrix. This leaves the industrial diamonds sticking for better cutting action, thus giving each wheel added life.

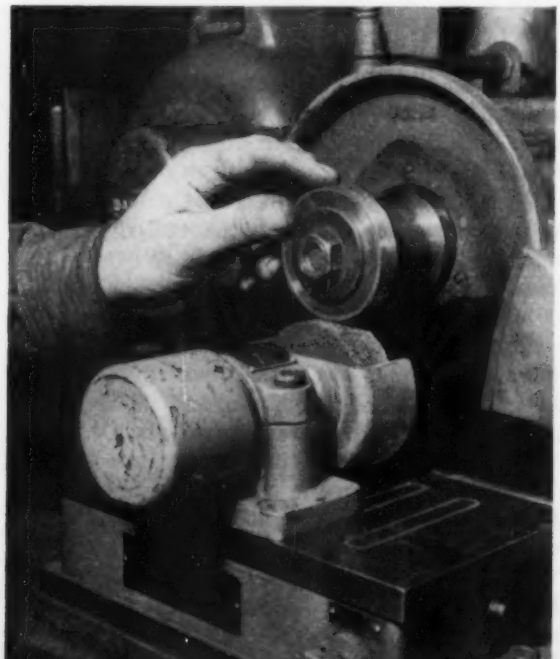
The new method takes on added importance in view of the present government diamond allocation program. Since there are not enough diamonds available to fill present demand, it is of utmost importance that each diamond wheel be used in the most efficient manner to obtain maximum output; and that the wheels be made to last as long as possible.

The diamond wheels are used at Wellman to cut grooves in silicon alloy material used for clutch plates. Various sizes are used: 3-in. diam, ⅛ and ¼ in. thick; and 8 in. diam, ⅛ and ¼ in. thick. The outer rim is a bonded ⅛ or ¼-in. thickness of industrial diamonds in brass matrix.

In service, the wheels wear down to a crown shape and must be squared up, or trued, and dressed. Truing is the process of restoring the cutting face of a wheel to running truth. Dressing is done for the purpose of improving the wheel's cutting action. Dressing the wheel is primarily a cleaning operation done by removing any load or minute amount of bond between the diamond particles. This job is done by the Osborn wire wheel brushes.



WIRE BRUSHES dress diamond wheels in this setup. Brushes remove some of brass matrix to expose more diamonds.



TWO WHEELS, pancaked together, are trued together in this setup. When parting line between wheels is no longer visible, crown has been removed and truing is complete.

In truing the diamond wheels, a brake controlled truing device is used. Two wheels are trued at the same time. They are pancaked together in a Delta Toolmaker held on a magnetic chuck. While the diamond wheels rotate, the rotating grinding wheel is passed back and forth across their face.

As much as 30 min of grinding is done, with approximately 1/32 of the diamond wheel taken off, depending on the amount of truing necessary.

When the surface of both diamond wheels is uniform and there is no visible parting line between the two wheels, the operator estimates that the wheels are squared up.

Dressing the wheels is done by an 8-in. Osborn wire brush. Both the brush and the diamond wheels rotate at 3600 vpm. The object here is to remove some of the brass matrix, leaving the diamonds sticking up for better cutting action.

Current control

Functions and applications of Regohm direct-acting finger-type voltage and current regulators are analyzed in a new engineering bulletin. The unit performs important control functions in servo systems of many types. Design advantages include low operating power, fast action, long operation, continuous and versatile control. *Electric Regulator Corp.*

For free copy insert No. 18 on postcard, p. 137

Wiring

A new brochure, *"20 Questions and 20 Answers on Safety m.i. Wiring,"* describes and illustrates the characteristics and advantages of mineral insulated wiring systems. A complete table of types, sizes, weights and lengths as well as a partial list of users is included. *General Cable Corp.*

For free copy insert No. 19 on postcard, p. 137

Hardsurfacing

Rainite hardsurfacing welding materials are described in a new booklet, *"What Hardsurfacing Can Do for You."* Studies indicate savings can be effected by use of hardsurfacing over the cost of machinery part replacement. Specific information as to recommended application procedures, rod selection, amperage, speed and other factors are presented. Suggested applications and Rockwell hardness of the Rainite line are given. *Rankin Mfg. Co.*

For free copy insert No. 20 on postcard, p. 137

Ball broaching

The ballizing process for high-speed, high precision hole sizing and finishing is described in a new bulletin. The process consists of pushing a precision ball of suitable hardness and size through the unfinished hole. With the method finished holes may be held to 0.0002 in. and are practically free of surface irregularities. *Industrial Tectonics Inc.*

For free copy insert No. 21 on postcard, p. 137

Look to

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CUSTOMER SERVICE, integrity and the fulfillment of contract promises and agreements—has built an enviable reputation for the FORT PITT BRIDGE organization over more than 53 years. May we serve you on your next project?

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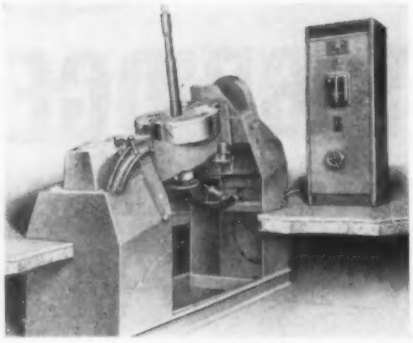
NEW equipment

New and improved production ideas, equipment, services and methods described here offer production economies . . . fill in and mail postcard on page 137 or 138.



Positioner for welding jet engine turbine wheels

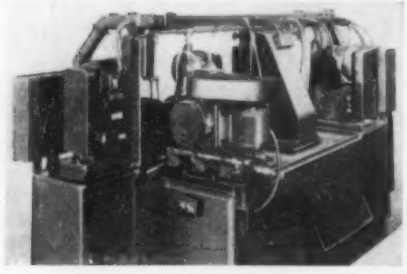
The new J-47 welding positioner consists of a cradle which is power-rotated through 180° so that welding can be performed on both sides of the assembly when welding the turbine-bucket wheel to the forged shaft of a turbo-jet engine. Assembly is carried on a variable-speed rotating spindle and is enclosed by power-operated insulated doors equipped with ports for welding. Operators have clear access to the work and are protected from heat and splatter. Assembly is maintained at 600°F by gas burners. Welding speed can be varied by special heavy duty variable-speed gear reducer. *Syracuse Special Machine Co.*

For more data insert No. 22 on postcard, p. 137

Universal grinder uses coated abrasive belts

This versatile grinder meets problems presented in the production of small parts that must be ground, finished, polished, deburred, off-hand. Employing the contact wheel method of coated abrasive belt polishing, the unit features platen supported belt grinding, concave and convex contour grinding and polishing and ¼ to ½ in. radius grinding and polishing, plus internal grinding attachments capable of doing areas from ⅝ to 2 in. ID. Grinder rotates 360° with automatic locking at every 90°. Three positions are possible: vertical, horizontal and perpendicular for off-hand operational requirements. *George F. Grant Co., Inc.*

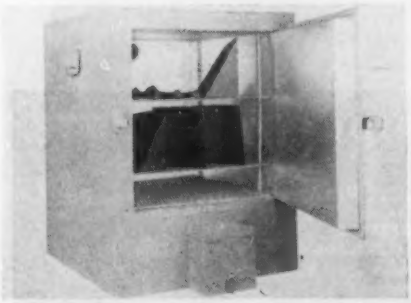
For more data insert No. 23 on postcard, p. 137



Transfer machine performs many operations

New automatic transfer machine of progressive in-line type, machines, cuts off to accurate length and finally chamfers both ends of the cut-off pieces. Design permits different types of machine operations to be performed on the bar stock prior to cutting to accurate length. Stock is held rigidly at each machining station. Machine handles 300 differential pinion shafts per hr at 100 pct efficiency. *Motch & Merryweather Machinery Co.*

For more data insert No. 24 on postcard, p. 137

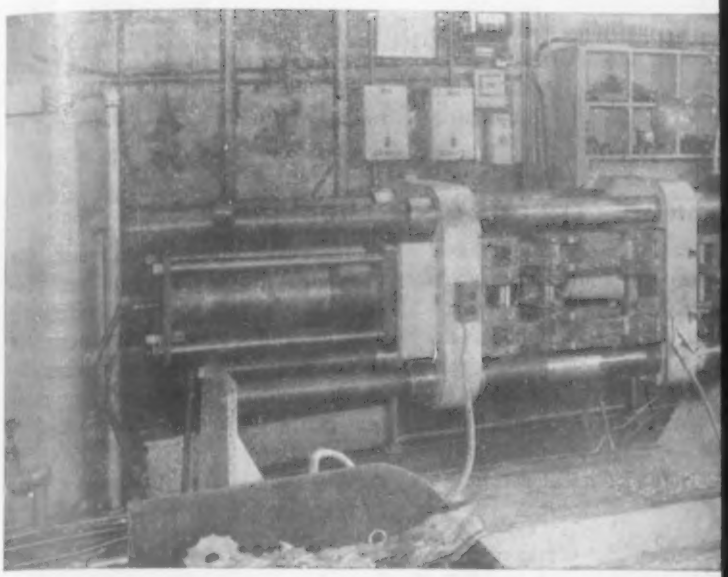


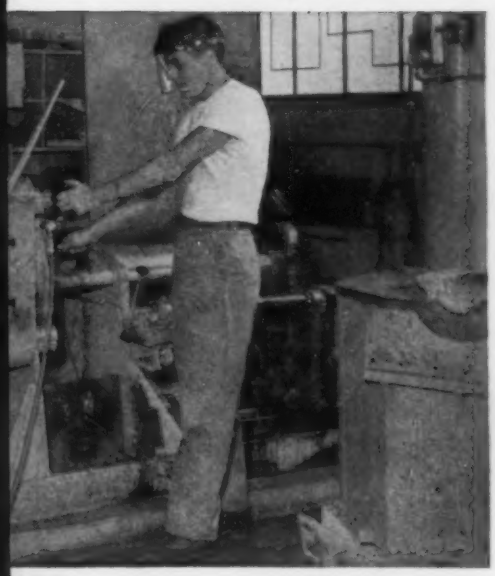
Welding oven dries coated electrodes

Model WRD-1 welding rod drying oven assures high welding efficiency by eliminating moisture absorption in low hydrogen and other coated electrodes. Gravity convected heat and economical storage are provided right at the point of use. Ten separate compartments hold 250 lb of electrodes. Compartments are removable for handling larger units. Reinforced mesh shelving permits efficient circulation of heat and controls moisture. *Despatch Oven Co.*

For more data insert No. 25 on postcard, p. 137

Turn Page





PYDRAUL SAVES LIVES

Officials and employes of Smith-Johnson Corporation, Los Angeles, are glad the company switched to Pydraul F-9, Monsanto's nonflammable-type hydraulic fluid.

A line leak caused Pydraul F-9 to be sprayed over the area of a die casting machine and zinc melting pot. There was no flash . . . no fire.

Although the operator of the machine was drenched and fluid was sprayed on about a half dozen men who were observing his job, no one was seriously injured.

You can switch to safe, efficient Pydraul F-9 simply by draining your present fluid and refilling. For details, contact the nearest Monsanto Sales Office or MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second St, St. Louis 4, Mo.

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PYDRAUL

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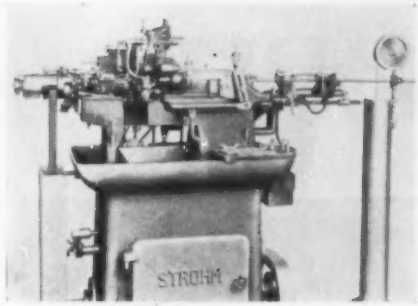
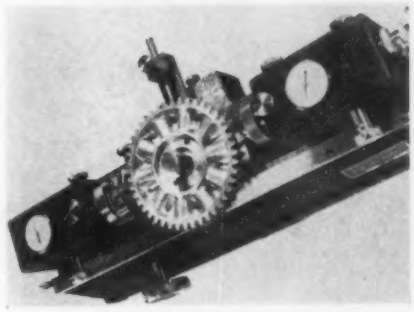


Small parts produced at close tolerances

Small screws, nuts, bolts, spindles, pinions, rivets and other precision components for instruments, optical and electrical products can be produced to extremely close tolerances at high rates of production on the Strohm long-turning automatic machine. Wide speed range makes it possible to set the machine up for high-volume production depending on the permissible cutting speed of the metal being worked. The machine handles thread lengths to 1.378 in. and bore depths to 1.575 in. Accessory equipment permits turning tapers to 4 in. long. *Kurt Orban Co.*

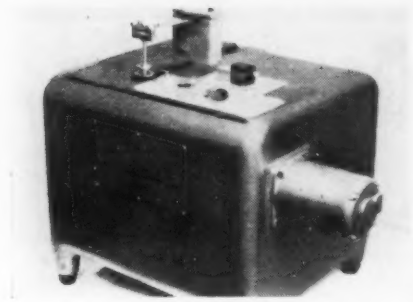
For more data insert No. 26 on postcard, p. 137



Helix adapter speeds gear checking

An adapter and an attachment have been developed for the Orlandi gear checker, used in every stage of production from blank to finished gear to improve quality, reduce scrap and speed production. The adapter simplifies setup for checking helix angle to the point of practically eliminating mathematical computations. A rolling attachment for use with master gear makes possible the rapid check of pitch diameter and concentricity accurate to 0.0001 in. Backlash can be checked with mating gears or master gears. *Orlandi Gear & Machine Co.*

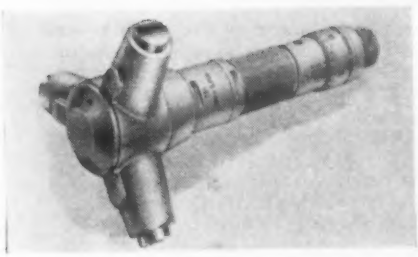
For more data insert No. 27 on postcard, p. 137



Fatigue machine has 25-lb force capacity

A table model fatigue machine is the smallest of five standard models ranging in alternating force capacity from 25 to 10,000 lb or 50 to 20,000 lb in one direction. Maximum of the loading yoke is ½ in. and testing speed is 1800 cycles per min. Simulated service tests of small parts can be made on the new model. Accessory preload attachment becomes part of the machine when desired. SF-2 is driven by a ¼ hp synchronous motor, has a dial load indicator, and a cycle counter. *Baldwin-Lima-Hamilton Corp.*

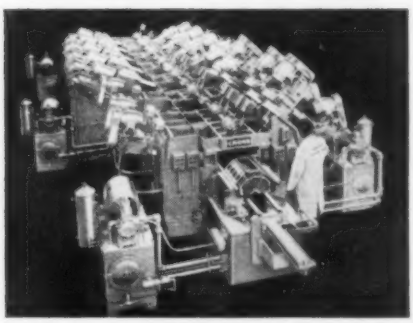
For more data insert No. 28 on postcard, p. 137



Measures bores and holes directly without masters

An internal tri-point micrometer, the B&S Intrimik, measures bores and holes directly without masters. Three measuring points make line contacts with the surface of the bore or hole so that the instrument aligns itself accurately both axially and radially. The Intrimik is manufactured in 16 individual sizes and in four sets, ranging from 0.275 to 4.000 in. *Brown & Sharpe Mfg. Co.*

For more data insert No. 29 on postcard, p. 137



Transfer-matic drills, reams V8 cylinder blocks

One unskilled operator can produce 82 cylinder blocks per hr at 100 pct efficiency, on a new Transfer-matic. The machine drills and reams the dipstick hole, drills the oil feed holes for the heads, and rough and finish reams the tappet holes. Fifteen stations are used; one for loading, 3 for drilling, 4 for reaming, 1 for cleaning and 6 for inspection. A feature is automatic gravity operated cam clamping of the pieces during the operations. Chips are moved to a central disposal point by a conveyer. Lubrication is automatic. *Cross Co.*

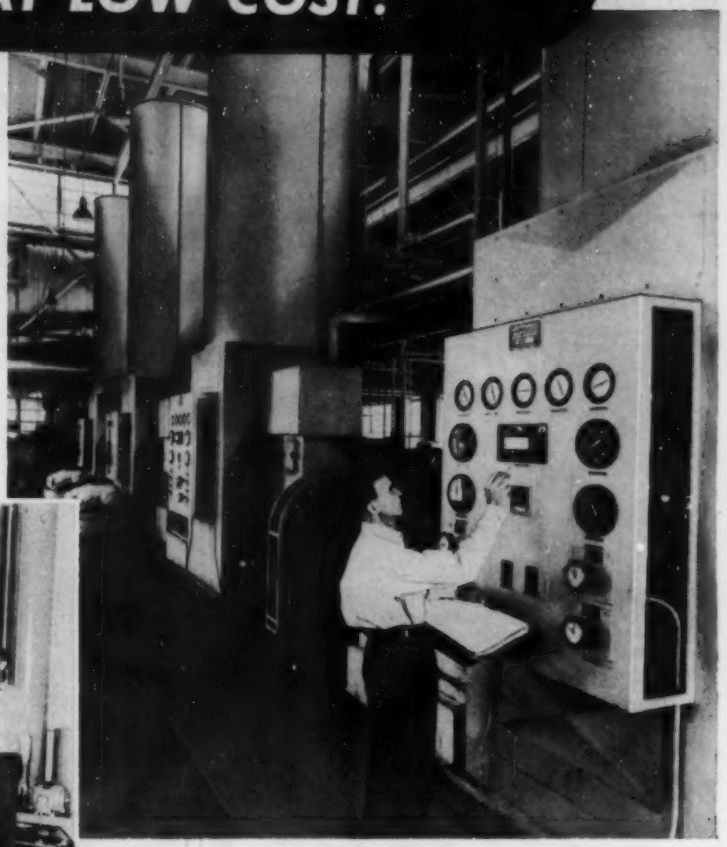
For more data insert No. 30 on postcard, p. 137

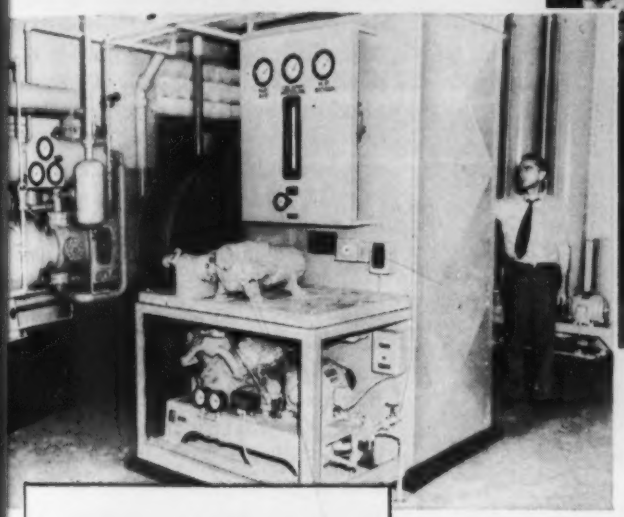
Turn Page

MAKE YOUR OWN OXYGEN and NITROGEN FROM AIR -- AT LOW COST!

Could You Use Large Quantities of Low-Cost Oxygen or Nitrogen?

If so, it will pay you to install an Air Products Generator and make your own. Numerous models are available with oxygen capacities from 200 cubic feet to 500,000 cubic feet per hour. *All of them have been proven by the acid test of operation in industry.*





ABOVE: Air Products Oxygen Generators in customer's plant. Capacity, 25,000,000 cubic feet per month.

LEFT: R-Series Air Products Oxygen Generator in customer's plant. Capacity, 500,000 cubic feet per month.

A Partial List of Users

American Chain & Cable Co., Inc.
Bethlehem Steel Co.
Thomas A. Edison, Inc.
Ford Motor Company
Granite City Steel Co.
Grede Foundries, Inc.
Hartford Hospital
Libby-Owens-Ford Glass Co.
Pathbone Mulliken Corp.
Pittsburgh Steel Foundry Corp.
Ross-Meehan Foundries
U. S. Armed Services

Noted for economy, dependability, and ease of operation, Air Products Generators employ the most advanced cycles, according to individual requirements.

Air Products, Incorporated, is a pioneer in the design and manufacture of oxygen-nitrogen generators and related equipment. A thoroughly experienced organization of over 500 people is occupied exclusively in this work. The overall background of Air Products in this field is unmatched by any other concern.

Air Products Generators have been in constant use for many years in the plants of nationally known companies. Some of these are listed at left. Air Products has effected substantial savings for all customers by eliminating the heavy costs, uncertainties and inconveniences of relying on outside sources.

We offer you experience based on the design and construction of over 400 successful oxygen-nitrogen generators.

Specialists in Equipment for All Low-Temperature Processes

Air Products OXYGEN — NITROGEN — ARGON **Generators**

AIR PRODUCTS, Inc., Dept. I, Box 538, Allentown, Pa.

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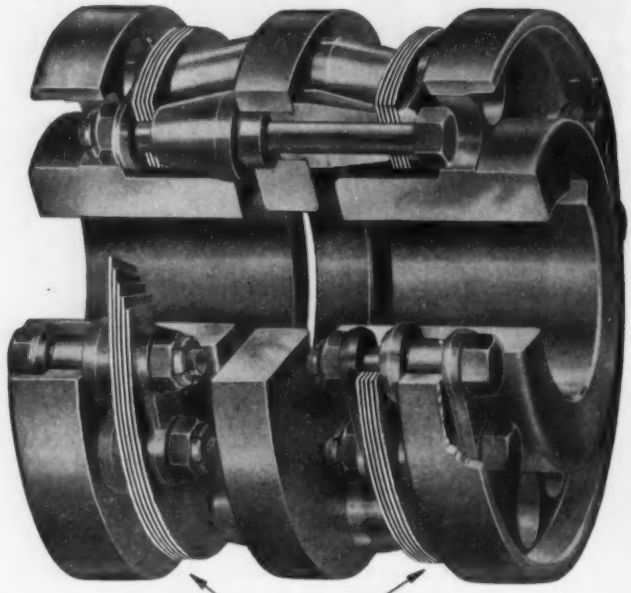
FOR POWER TRANSMISSION • REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes: ½ to 40,000 HP — 1 to 30,000 RPM.

Specialists on Couplings for more than 30 years



PATENTED FLEXIBLE DISC RINGS

BACKLASH FRICTION WEAR and CROSS-PULL are eliminated LUBRICATION IS NOT REQUIRED!

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

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NO MAINTENANCE PROBLEMS.

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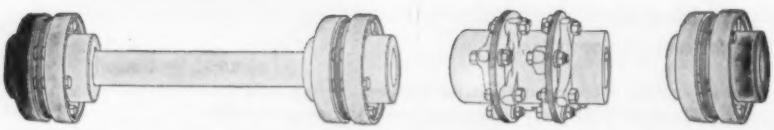
ALL PARTS ARE SOLIDLY BOLTED TOGETHER.



Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Platform truck

A new telescopic high-lift platform Worksaver is a powered hand truck designed for high stacking of skids and skid bins. With 4000-lb capacity, the model has a lowered platform height of 6½ in. and will lift loads to 126½ in. For stability and traction, the unit has an articulated frame that permits continuous floor contact of load and drive wheels, despite ramps and floor variations. Hoist pushbutton is located on the operator's control handle. Hand or foot control permits adjustable-speed lowering. Brakes are applied and power is off when the control handle is in full-up or full-down position. *Yale & Towne Mfg. Co.*

For more data insert No. 31 on postcard, p. 137

Rubber-metal shapes

Custom-fabricated parts consisting of molded rubber shapes bonded to any ferrous or nonferrous metal component or to various ceramic compositions are available for application in processing equipment, control valves, conveyer, heat treating equipment, etc. Parts are fabricated from natural or reclaimed rubber stocks and from synthetics; have tensile strength from 500 to 3500 psi. Durometer hardness ranges from 30 to 100 and elongation from 50 to 900 pct. Rubber-bonded-to-metal parts can be furnished that will remain stable upon exposure to −75° to +200° F. temperatures. *Andrews-Alderfer Co.*

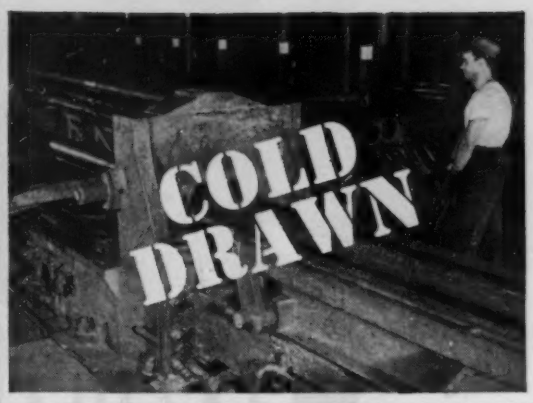
For more data insert No. 32 on postcard, p. 137

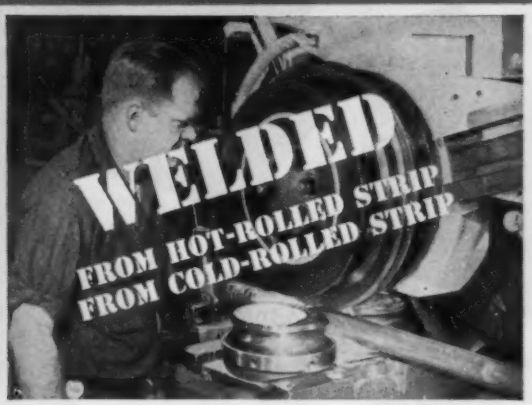
Turn Page

Let's take a

CLOSER LOOK

at TYPES of Tubing





Different in surface finish. Different in dimensional tolerances. Different in machinability. Different in cost. Once you have determined to simplify fabrication of hollow parts with versatile seamless or welded tubing, be sure you're using the *right type* for the job at hand. If you're a long-time tubing user, review all types available to *know* that you're getting the most for your money. Each type has its place—ONE type is best for *your* specific requirement.

The B&W Technical Staff is always ready to cooperate with you in the selection of the proper carbon, alloy, or stainless tubing for your job. Their aim is to help you avoid difficult fabricating problems, eliminate rejects, and save production time and costs.

If you have a specific tubing requirement, tell us end-use, OD, ID, size of finished part, method of chucking and sequence of machining operations, description of finished part, finishing procedure—welding, brazing, plating, heat-treating, carburizing, nitriding, special dimensional accuracy if required, and type of finish desired. Put your problem up to Mr. Tubes—your B&W Tube Representative.

New Bulletin TB-340 is a compact guide to mechanical tubing possibilities, and well worth writing for.

THE BABCOCK & WILCOX COMPANY
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V 2.15% —Co 4.75%)

VANITE
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V 2.15%)

CLARITE
(W 18.00% —
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Easy adjustment

The Berger pallet rack is tailor-made to the actual dimensional specifications of the user's pallets. The rack has maximum dimensions of 60x60x120 in. and can be furnished with extra heavy tubular supports or solid shelves. Heavy gage upright members are notched on 6-in. centers from 14 to 92 in. and it takes only 30 sec for one man, without tools, to move a shelf up or down within the rack. Rack carries 3000 lb maximum per shelf. It can be furnished in single face, double face, single entry or double entry groups. Units are shipped knocked down. *Berger Mfg. Div., Republic Steel Corp.*

For more data insert No. 33 on postcard, p. 137

Commutator saw

A new hub type solid carbide saw designed for commutator undercutting can also be used for other slitting and slotting work. A brazed ring forms a part of the hub and makes hub and solid carbide blade completely bonded and rigid. Diameters range up to 3 in. *Gay-Lee Co.*

For more data insert No. 34 on postcard, p. 137

Bright silver plate

New commercial silver plating process makes it possible to obtain bright silver plate without buffing or scratch brushing. Called Silver-Lume, the process produces a more tarnish-resistant surface; has a wide bright range; requires no special equipment. It produces good deposit - distribution and uniform color. *Hanson-Van Winkle-Munning Co.*

For more data insert No. 35 on postcard, p. 137

Serrated-edge belt

The 3M brand Scallop-Edge abrasive belt is designed for automatic precision grinding and finishing of jet turbine and compressor blades in a single operation. It will also find application in the manufacture of hand tools, cutlery and other operations involving small-radius grinding and filleting that was previously done by hand. Scallops of the belt curve around the edges of the contact wheel, allowing fillet areas to be polished on the edge-contour of the wheel. Belt is used on crowned, contoured or rounded-edge wheels. *Minnesota Mining & Mfg. Co.*

For more data insert No. 36 on postcard, p. 137

Process control

An electronically operated circular chart controller can control industrial processes according to time-temperature schedules. Where both time and temperature control are important for product quality and efficiency of operation, the instrument has an integral-program cam mechanism which automatically positions the instrument control point in accordance with a predetermined program. The standard Brown continuous balance system is used for measurement. An adjustable microswitch assembly, operated by the cam, is optionally available. *Minneapolis-Honeywell Regulator Co. Brown Instruments Div.*

For more data insert No. 37 on postcard, p. 137

General purpose relays

Hermetically-sealed relay meets all military specifications. It resists harmful atmospheric conditions, including salt spray, high humidity, sand, and varying air pressures. It operates in its own atmosphere, completely independent of conditions outside the electro-tin plated, drawn-steel housing. Advanced armature and magnet design give it greater force or pull. It is a 4-pole, double-throw type, with a contact rating of 3 amp, 28 v dc or 115 v ac. *General Electric Co.*

For more data insert No. 38 on postcard, p. 137

Turn Page

Specialists in Industrial Cleaning Products

After 432 hours in salt spray, corrosion has just begun on PRE-Fos-processed steel.

"Phosphating cleaner consumption cut 25%!"

—PRE-FOS field report

And here are more field reports:

"We can run one to two weeks longer before dumping!" "Humidity cabinet resistance improved 80%!" "Best cleaning our washer has ever produced!"

Everywhere users are hailing the unchallenged superiority of Wyandotte PRE-FOS*, the sensational *new* phosphating cleaner that cleans; deposits a fine-grained phosphate coating—an ideal paint base; and prevents rust of in-process steel parts.

PRE-FOS performs in hard or soft water, can be used in spray washer or soak tank and has long solution life. It rinses freely and completely; does not corrode mild steel equipment; reduces sludging.

Read the comparative tests on PRE-FOS and four competitive products, below. Then investigate this great, new cleaner! And be sure to write us for help with *any* of your cleaning problems. We'll be happy to serve you. *Wyandotte Chemicals Corporation, Wyandotte, Michigan; also Los Angeles 54, California.*

CLEANING THE WORLD

*Reg. U. S. Pat. Off.

Product	Hours to failure in salt spray. Panels spray processed 3 minutes, 2 oz./gal., 35 lbs./sq. in. pressure, 160°F. Finished with appliance white enamel and baked; paint thickness 0.0007 inches.	Spray washer cleaning rating. 2 oz./gal., 25 lbs./sq. in. pressure, 160° F., drawing compound and heavy oil soils.	Soak cleaning rating. 4 oz./gal., 170° F., no agitation, mixed and mineral oil soils, 10-minute immersion.
A	failed—408 hours	fair	fair
B	failed—120 hours	fair	fair
C	failed—192 hours	good	good
D	failed—240 hours	poor	poor
Pre-Fos	no failure—420 hours	excellent	excellent

THE WYANDOTTE LINE—products for burnishing and burring, vat, electro, steam gun, washing machine and emulsion cleaning, paint stripping, acid pickling, related surface treatments and spray-booth compounds. An all-purpose floor absorbent: Zorball. In fact, specialized products for every cleaning need.

Largest manufacturers of specialized cleaning products for business and industry

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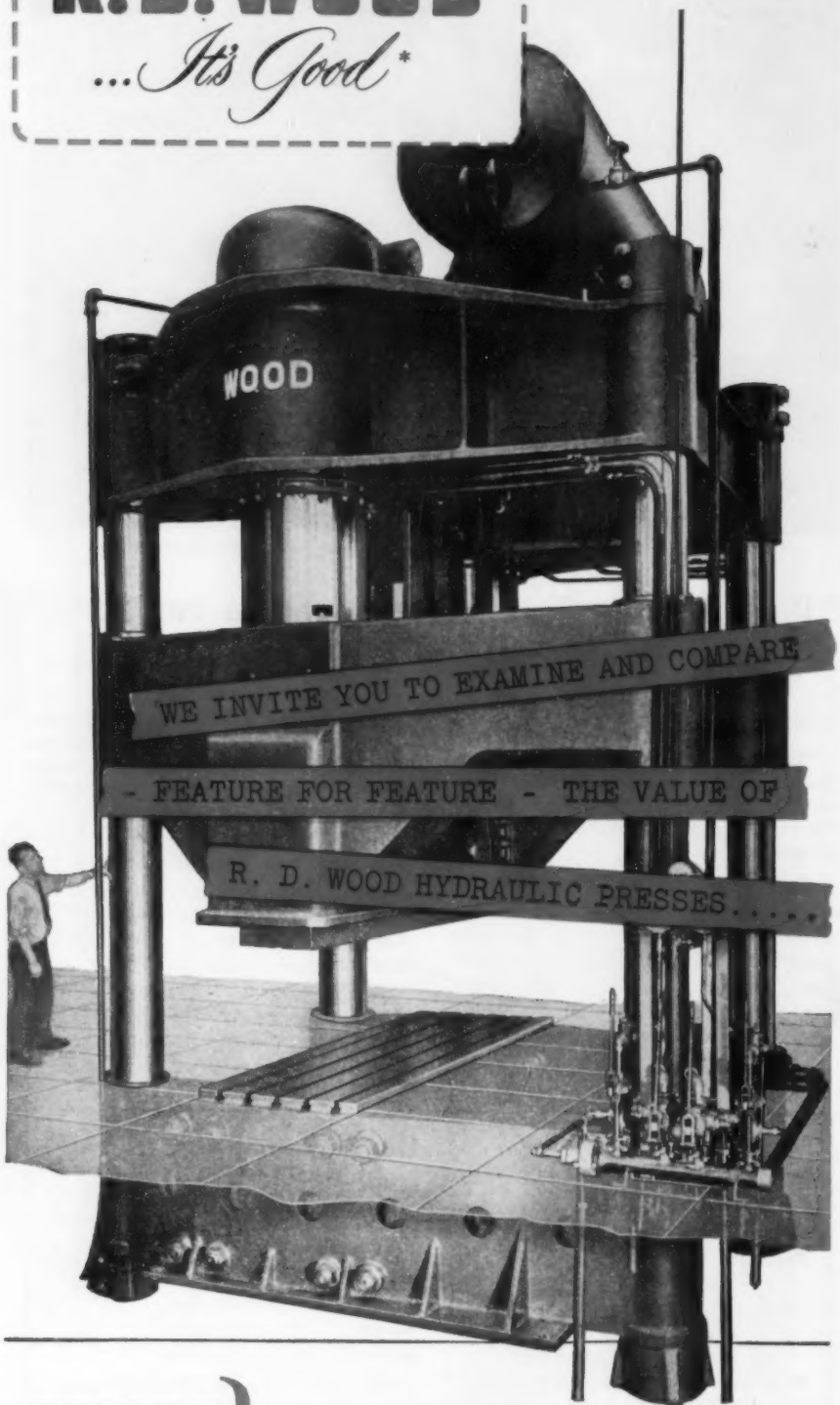
Helpful service representatives in 88 cities in the U.S. and Canada

If it's an
R.D.WOOD
*...It's Good**

1500-ton forming press for bending and forming heavy steel plates. Moving platen can be tilted to 12° left or right during stroke.



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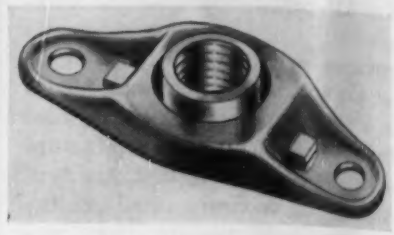


Floating anchor nut

Consisting of an assembly of two parts—a threaded nut portion and a retaining shell—a new floating anchor nut provides a 1/16-in. radial movement between the nut and the anchoring portion. Both parts are light gage annealed spring steel, spring tempered to provide a lightweight, rigid and strong, fastening device. Kaylock floating anchor nuts are identical in outline and size to standard fixed anchor nuts of comparable thread size, permitting a complete interchangeability. *Kaynar Mfg. Co., Inc.*

For more data insert No. 39 on postcard, p. 137

Cageless bearing

The guided roller bearing principle that maintains roller alignment without space-wasting cages is available in the McGill Guiderol roller bearings. The design principle utilizes grooved rollers and a guide rail to keep the rollers in alignment. Any shift off-center causes contact between roller and rail, and instantly returns the roller to the true axis. Guiderol bearings may be mounted in any position from horizontal to vertical. *McGill Mfg. Co.*

For more data insert No. 40 on postcard, p. 137

Industrial trailer

For use as an assembly dolly in the line production of heavy equipment, a 15-ton capacity trailer is tractor drawn from one station on the line to the next. Its wheel suspension, with each four wheel truck mounted on a heavy swivel, provides uniform load distribution at all times. This permits use to full rated capacity over rough floors and across yard areas. *Kilbourne & Jacobs Mfg. Co.*

For more data insert No. 41 on postcard, p. 137

Steel shore

Self-contained, telescoping steel shore that is handled by one man, permits micro-adjustment in a 5-ft range. The product is used in supporting forms for beams, concrete slabs, walls, tunnels and other shoring work. No jacks or other accessories are required. Three sizes handle range from 6 to 15½ ft; load capacity to 9,900 lb. *Safway Steel Products.*

For more data insert No. 42 on postcard, p. 137

Twin hydraulic ram

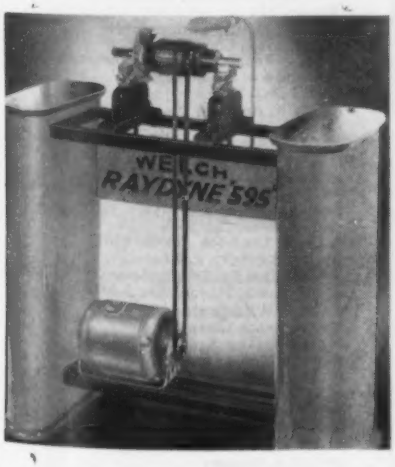
Weighing 23 lb and having center hole construction, a new 30-ton twin ram does pulling and installing jobs. It works in any position is fully adjustable, eliminates torque and takes the hard work out of pulling and installing operations. It is 6¾ in. high x 7½ in. wide, 3 in. thick and has 2½ in. ram travel. Complete sets of attachments are available. *Owatonna Tool Co.*

For more data insert No. 43 on postcard, p. 137

Low cost shop balancer

A dynamic balancing machine offers a simplified shop method of indicating unbalance in rotating parts weighing up to 100 lb without necessity of making specially fitted bearings, adapters or universals. These are eliminated by the V type bearings employed in the machine, assuring accurate bearing fit over a wide diameter range. Point on the work needing weight correction is indicated by an instant flashing stroboscope. Balancing work can be learned by average workman. *Welch Mfg. Co.*

For more data insert No. 44 on postcard, p. 137

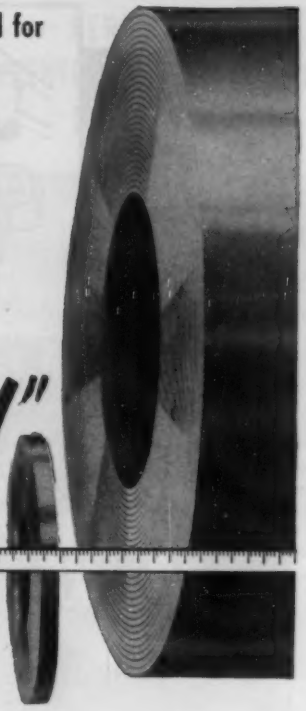


Turn Page

The only plant in the Eastern U.S. equipped for

COIL pickling

From 48" down to 1"



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- EDGE ROLLING • SLITTING
- COIL SHEARING
- SHEET PICKLING—any width, any length, any thickness

Write for Detailed information folder

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Subsidiary: AMERICAN TOOL & SUPPLY CO.

OFFICE: FRICK BUILDING, PITTSBURGH 22, PA. PLANT: McKEES ROCKS, PA.

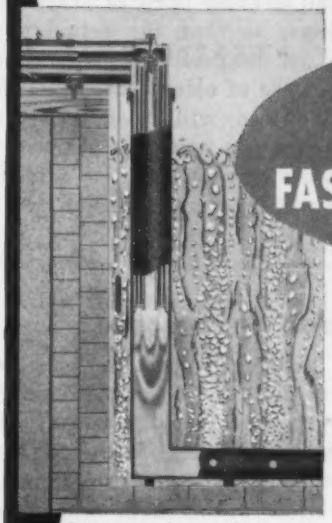
Submerged Combustion

DIRECT FIRED GAS BURNERS

for Important

SAVING in ACIDS

FASTER, CLEANER PICKLING



Exposed view Submerged Combustion Burner installed directly in pickling vat. Automatically gas fired. Low cost operation.

- Flame burns below surface, heats and agitates acid for faster, cleaner pickling.
- Will not dilute acids. Reduce acid costs, reduce cost of waste acid disposal.
- Require no boiler. Burn any type gas. Installed in any type tank. Now used in leading plants.

free *Send for descriptive booklet #41 and details*

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OF AMERICA, INC.

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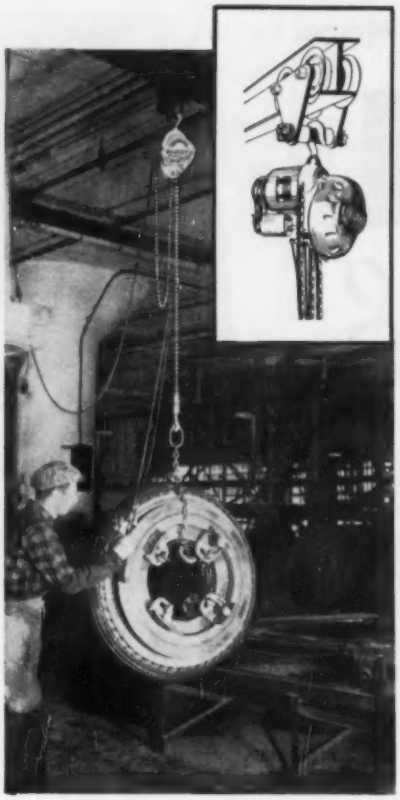

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The 'Budgit' Hoist converts electricity into powerful hoisting action. Every capacity — from 250 to 4,000 pounds. Uses only a few cents worth of electricity to lift loads all day. Operators retain their efficiency, avoid the hazards of lifting.

Every 'Budgit' Hoist is a complete lifting unit in itself! No extras to buy. Just hang it up, plug into the nearest electric socket, and use! A.C. and D.C. models. Prices start at $119. For more detailed information, write for Bulletin No. 391.

'BUDGIT' CONDUCTOR CORD TROLLEYS — keep flexible conductor cord up out of way while carrying electricity to monorail hoists. Roll smoothly around curves, past switches.

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MANNING, MAXWELL & MOORE, INC.
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Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

—New Equipment—

Continued

Nickel on aluminum

A process for nickel coating aluminum produces a stress-free, hard, resilient coating. Synthetic rubber compound developed by Hamilton Standard Div. of United Aircraft Corp. is used to establish a bond between the aluminum and the nickel plate. The material is sprayed onto aluminum to the required thickness. After drying, the piece is then plated with nickel by conventional means. A component can be Alni-Clad, as the process is labeled, in approximately 24 hr. Finished Alni-Clad pieces have a hardness of 400-450 Vickers and are stress free. Surface is semi-bright and can be polished chemically or mechanically to a high luster. *Bart Laboratories Co., Inc.*

For more data insert No. 45 on postcard, p. 137

Lead lubricant

Known as Lead-Lube, a new heavy duty grease lubricant has a high metallic lead content in the form of pulverized lead dust, kept in permanent suspension. Function of the metallic lead in Lead-Lube is to form self-lubricating surfaces over all wearing parts of gears and bearings, so that the actual surfaces will be protected from wear. In the case of older equipment, th metallic lead will re-surface pits and scores, to restore a degree of efficiency comparable, it is said, to that which existed before wear. *Knapp Mills, Inc.*

For more data insert No. 46 on postcard, p. 137

Vapor detectors

Two redesigned portable vapor detectors indicate concentrations of mercury which could be harmful to industrial workers. The electronic instrument gives an instantaneous indication of mercury vapor by resonant absorption of ultra-violet energy. It will give instantaneous readings ranging from 0.01 to 3.0 milligrams of mercury per cu m of air and features greater operational stability independent of line voltage. Accuracy is said to be within ± 5 pct. *General Electric Co.*

For more data insert No. 47 on postcard, p. 137

ATLANTA, Georgia
Morrison-Drabner Steel Co., Inc.
82-84 Milton Ave., Alpine 4885
BALTIMORE, Maryland
Hill-Chase Steel Company of Maryland
6311 Erdman Ave., Peabody 7300
Asheboro, N.C.: Phone 8849
Richmond, Va.: Phone 7-4573
BEAUMONT, Texas
Standard Brass & Mfg. Co.
705 Milam St., Phone 4-2641
CHICAGO, Metropolitan Area
Korhumel Steel & Aluminum Co.
2424 Oakton St., Evanston, Ill.
Ambassador 2-6700
CINCINNATI, Ohio
Morrison-Drabner Steel Co., Inc.
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CLEVELAND, Ohio
Nottingham Steel Company
W. 45th St. & Division Ave., Atlantic 5100
Copper & Brass Sales, Inc.
7711 Grand Ave., Endicott 1-6757
DALLAS, Texas
Delta Metals, Inc.
3201 Oak Lane Street, Hunter 7446
DAVENPORT, Iowa
Nichols Wire & Aluminum Co.
1725 Rockingham Rd., Phone 3-1895
DETROIT, Michigan
Cauhorn Distributing Company
9999 Broadstreet, Texas 4-7000
Copper & Brass Sales, Inc.
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INDIANAPOLIS, Indiana
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229 E. South St., Riley 9311
KANSAS CITY, Missouri
Industrial Metals, Inc.
410 Southwest Blvd., Victor 1041
LOS ANGELES, California
Eureka Metal Supply Company
551 E. Macy St., Mutual 7286
Earle M. Jorgensen Co.
10650 S. Alameda, Lucas 0281
Reliance Steel Company
2068 E. 37th St., Adams 6133
MILWAUKEE, Wisconsin
KHP Milwaukee Steel Company
4600 W. Mitchell St., Evergreen 4-6000
MINNEAPOLIS, Minnesota
Korhumel, Heffron & Preiss Steel Co.
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Gladstone 5943, Prior 4030
NEW ORLEANS, Louisiana
Orleans Steel Products Co., Inc.
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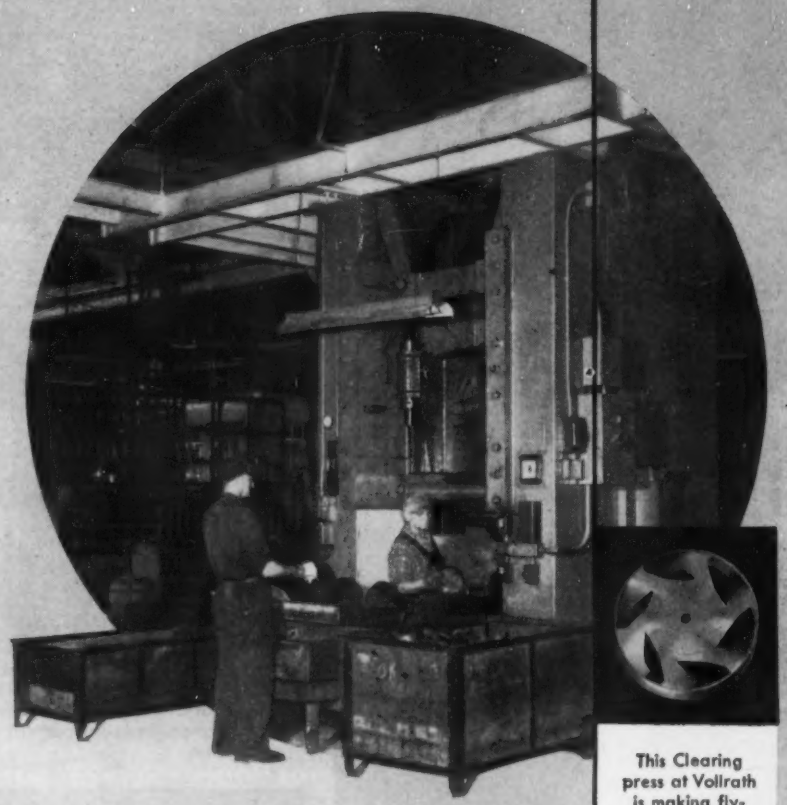
LISTEN to the difference



This Clearing press at Vollrath is making flywheel fans for lawn-mower engines.

It may be strange to think of a metal-forming press as QUIET in operation, but that's what The Vollrath Company of Sheboygan, Wisconsin, think about their Clearings in comparison to their other presses. Since this company has been making the famous Vollrath Ware since 1874, you can be sure they know presses, and are putting proper value on an important consideration.

Their Clearing presses require definitely less maintenance than their other, less quiet presses. That, of course, is the payoff. The Vollrath people know that noisy operation means strain and wear—and ultimate cost. That's why they buy Clearings.

When you buy or specify a press, we suggest you listen to the difference. It's a good way to save money.

CLEARING MACHINE CORPORATION
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CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

—Technical Briefs—

Press:

Aluminum and stainless steel up to ¼ in. handled on press.

Lockheed's Hall of Giants, where some of the world's largest metal-working tools are assembled for production of jet aircraft, has another addition, a big press.

Parts can be formed from both high-strength aluminum alloys and stainless steel sheets on the $150,000 20-ton Cecostamp press. Sheets from 0.051 to 0.250 in. thick can be handled.

Handles Big Sheet—A Kirksite die and lead punch are generally used. The press has a capacity for sheets up to 10 x 8 ft. When the die has been correctly positioned on the press bed, dowel-pins are located at points opposite the corners of the die and lead is poured around the dowel-pins and up to the die-block to hold the latter securely in place.

The machine is mounted on a solid concrete "inertia" block, 16 ft deep, which floats on springs. No vibration is felt on the surrounding shop floor when blows are struck, even though the impact be twice that exerted by conventional drop-hammers used in the aircraft industry.

ALUMINUM AND STAINLESS sheets up to 10 x 8 ft are handled in big Cecostamp press at Lockheed. Concrete inertia block base floats on springs.

Thickness Gage:

Ceramic coatings 0.0005 in. can be measured on new instrument.

Thickness of ceramic coatings can now be measured within 0.0005 in. with an instrument built by the Ryan Development Laboratory. Designed by the National Bureau of Standards, the device provides a

nondestructive method for determining the gage of protective coatings applied to nonmagnetic materials.

Two Parts—A plastic test head in which an electromagnetic probe coil is embedded and an inductance balance indicator which utilizes a galvanometer make up the gages. Protruding through the coil is a slender plastic rod attached to a dial indicator gage. This rod is free to move axially and its displacement is indicated by the gage.

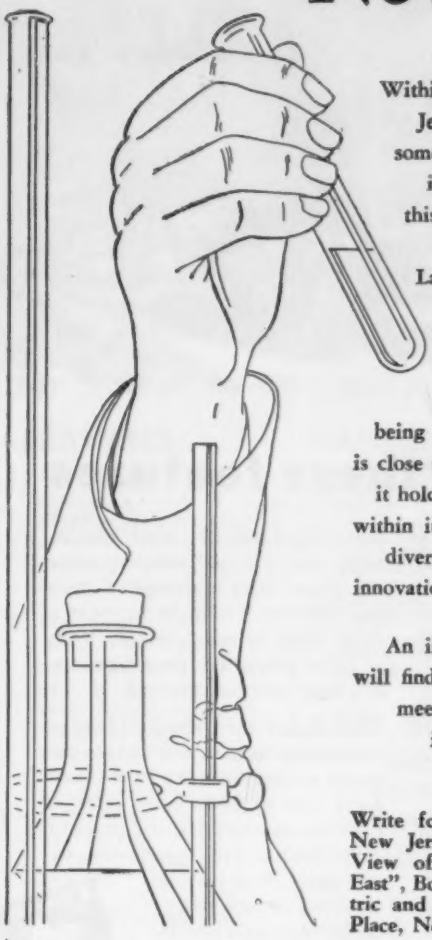
Principle involved is the change in inductance of a coil when it is brought in proximity to a metal surface. The metal acts as a sort of short circuiting device which critically affects the coil's inductance over very short distances. Presence of the ceramic material has no appreciable effect on the field at the frequency used.

CERAMIC COATING thickness of metal parts can be measured within 0.0005 in. with gage built at Ryan Development Laboratory.

FIRE PROTECTION results from mechanical snowstorm. Sprinkler and foam injection system, recently installed at Syracuse, N. Y., plant of Solvay Process Div., Allied Chemical & Dye Corp., works fast. Heat detectors set off high pressure system.

Turn to Page 156

What's New in New Jersey?



Within a highly concentrated area in New Jersey are more than 400 facilities where some kind of research and development is under way. The newest addition to this incubator of industrial activity is the James Forrestal Research Laboratory at Princeton, New Jersey.

There are important reasons why $150,000,000 a year—more than 10% of the nation's research—is being spent in New Jersey. New Jersey is close to home offices in New York City . . . it holds an amazing diversification of industry within its borders . . . and this nearness of diversified plants makes it possible to put innovations into pilot production.

An industrialist moving to New Jersey will find a variety of research facilities to meet the needs of a dynamic, expanding business.

Write for the new digest about New Jersey — "An Industrialist's View of the Crossroads of the East", Box D, Public Service Electric and Gas Company, 70 Park Place, Newark, N. J.

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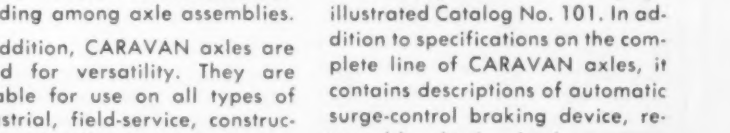
Give you these features

Double-acting spring cushioned draw bar to minimize stopping and starting shock, positive trail at high speeds, maximum roadability on rough terrain, sturdy solid steel axle beam construction . . . these features combine to make CARAVAN units outstanding among axle assemblies.

In addition, CARAVAN axles are noted for versatility. They are suitable for use on all types of industrial, field-service, construction and military equipment . . . wherever dependable portability is needed.

Both single axle (2-wheel) assemblies and 4-wheel running gear equipped with automotive type steering are available to meet a wide range of requirements. Units of either straight or drop type construction can be supplied.

Write today for United's 12-page illustrated Catalog No. 101. In addition to specifications on the complete line of CARAVAN axles, it contains descriptions of automatic surge-control braking device, retractable third-wheel assembly and other CARAVAN accessories.



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Phone SEneca 4232
Teletype SE-316

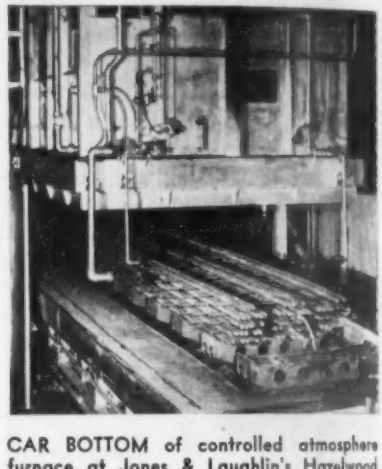
—Technical Briefs—

Carbon Restoration:

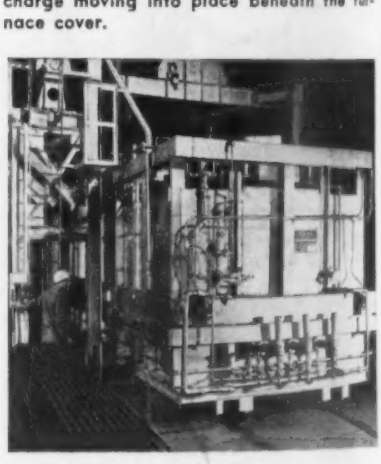
Controlled atmosphere furnace restores carbon to metal skin.

A controlled atmosphere furnace at the Hazelwood Cold Finishing Dept. of Jones & Laughlin Steel Corp., Pittsburgh, is supplying carbon-restored bars. Attainment of heat-treated hardness at the metal surface without removing a decarburized skin is now possible.

In operation since last December, the big car-bottom type furnace



CAR BOTTOM of controlled atmosphere furnace at Jones & Laughlin's Hazelwood Cold Finishing Dept. is shown with a bar charge moving into place beneath the furnace cover.



COVER OF FURNACE is lowered over car carrying bars to be recarburized. Controlled atmosphere is made up of nitrogen, carbon monoxide, and hydrogen.

was installed by Surface Combustion Corp. It is the first furnace of its kind designed specifically for carbon restoration. It can also be used for annealing, bright annealing, spheroidizing and normalizing.

Car Holds Charge—The charge of bars is placed on work supports on the car bottom. The furnace can

hold up to 80,000 lb of bars, depending on size. The car rolls under the furnace cover, and the cover is lowered onto the bottom enveloping the charge.

An inert mixture of nitrogen, carbon monoxide and hydrogen is first passed into the furnace. This inhibits any reaction on the surface of the bars while the furnace is being brought up to working temperature.

When working temperature is reached, more gas, richer in carbon monoxide, is forced into the furnace. This provides the high carbon potential for carbon restoration.

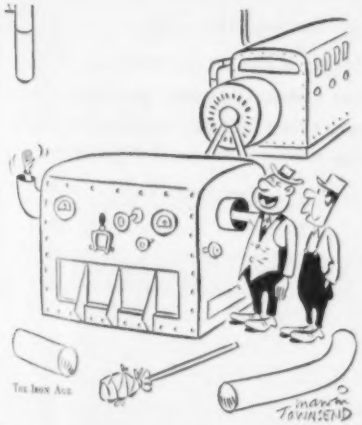
Powder Parts:

Toy maker uses over 1 million lb. of metal powder per year.

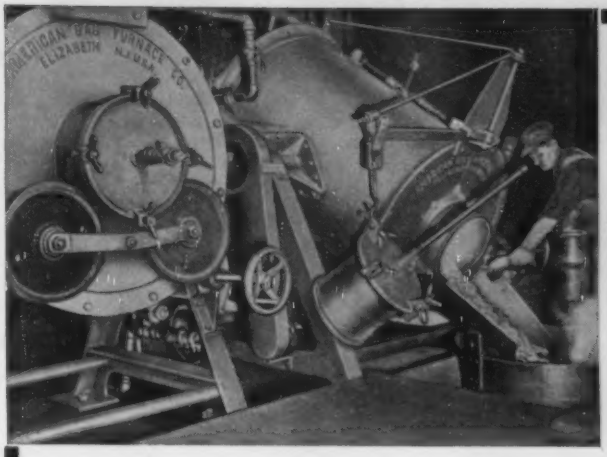
In-plant powder metallurgy has paid off for the Lionel Corp., big maker of toys, in lower costs per part and less time between original concept and final production.

Joseph L. Bonanno, chief engineer, recently told powder metallurgists that in less than 6 years this company has developed a highly succesful powder metallurgy department using over 1 million lb of metal powder per year.

Tons of Parts—Tons of miniature wheels and other parts are produced. Equipment has been designed to handle a fairly constant base load. Because of the cost of heavy tonnage presses, most production is limited to small parts. Large parts are subcontracted to specialists with suitable equipment.



"See, I told you this pipe wasn't clogged."



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for uniform

CABURIZING
Ni - Carbing*

These AGF Model 2G Rotary Gas Carburizers, slowly rotate the work for complete and uniform hardening results.

FEATURES

1. The labor of charging and discharging is reduced to a minimum by the tilting feature.
2. The retort remains in the furnace at all times and is heated once only, at the beginning of the run. There are no boxes to be handled repeatedly and to be replaced at rather frequent intervals.
3. The cost of operation is extremely low.
4. Each furnace is an independent unit to give efficient operation either on maximum or reduced output.

CAPACITY—
When 2/3 full the capacity is 6000 cubic inches. Other sizes with capacities ranging from 95 to 18,500 cubic inches per load are available.

RETORT SIZE—
Inside diameter—14½", available length —45".

WIDE ADAPTABILITY—
This furnace can be used for CLEAN hardening, annealing, normalizing and a variety of controlled atmosphere purposes with modifications of any kind.

*The original ammonia-gas case hardening process.

Write for full details upon AGF Rotary Gas Carburizers indicating your products and production requirement.

AMERICAN GAS FURNACE CO.
1004 LAFAYETTE STREET, ELIZABETH 4, N. J.

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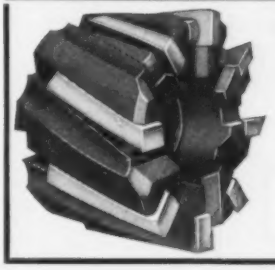
INSERTED-BLADE METAL CUTTERS FOR EVERY NEED



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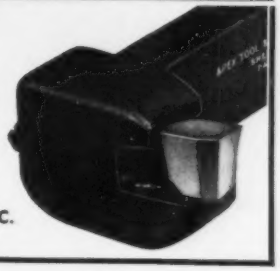
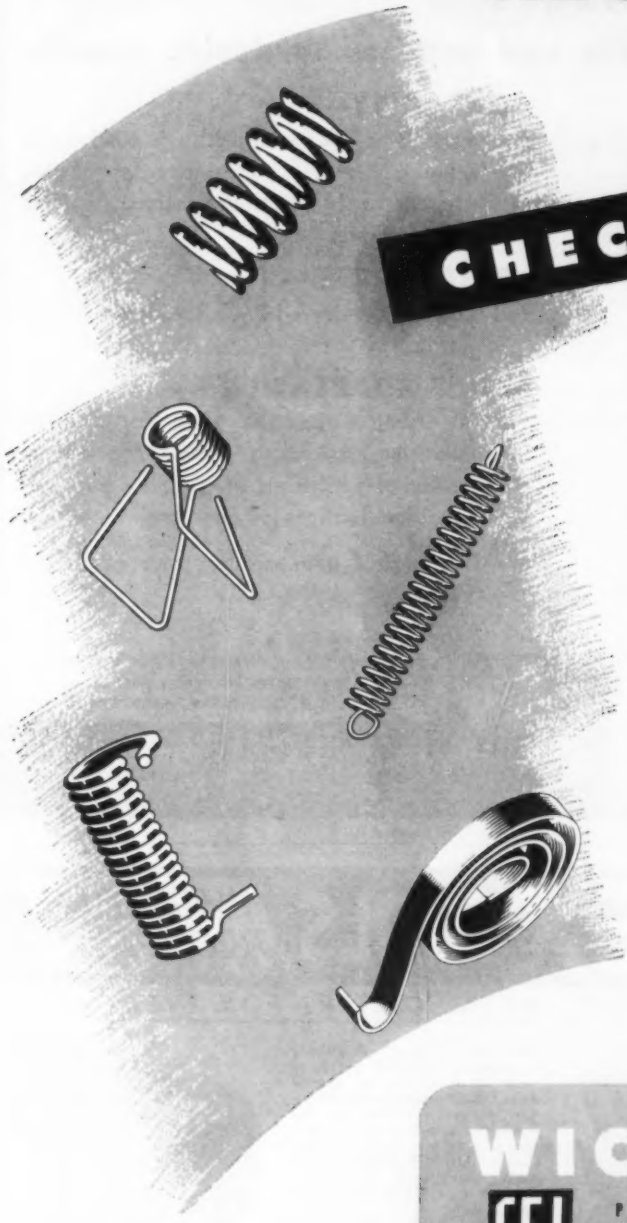


APEX TOOL & CUTTER CO., INC.
SHELTON 12, CONNECTICUT

WIRE

REQUIREMENTS?



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Industry Resists Government's Squeeze Tactics

Iron Age survey shows industry's profits tumbled 13.2 pct last year . . . That's why price rise must compensate wage increase . . . Dividends to stockholders tumbled, too.

Holding up settlement of the steel labor impasse was a blunt turndown early this week by Phil Murray, steelworkers' union chief, of a new compromise offer by steel firms. Mr. Murray stuck to his guns that the union get "all or nothing" of the WSB recommendations.

As soon as groundwork for a contract settlement is reached, steel firms expect the steel price angle to be settled. The amount will not be as much as steel companies had demanded publicly. It will range around $5 a ton or perhaps slightly more.

Steel firms were expected this week to go into court in an attempt to forestall the government from taking over the industry. Barring a last minute miracle steel loss this week will approach 1 million tons. Thereafter a shutdown will mean a loss of 2 million tons a week.

Eventual settlement of the steel labor impasse will probably approximate 15¢ an hr plus 5¢ to 7¢ in fringe benefits. There will be no giving in on the union shop by steel firms. If Mr. Murray gets a good economic package he may give up, for the time being, the union shop. A turn for the worse this week or next will take the dispute to the White House.

The Record Shows—An industry-wide survey just completed by THE IRON AGE shows why the steel companies keep insisting that higher wages must be compensated by higher prices. Significantly the survey shows that higher taxes and operating costs (with no price increase) sent steel industry profits into a tailspin in 1951.

Of the 27 steel producers listed in THE IRON AGE Financial Analysis for 1950-1951, only nine reported higher earnings in 1951 over the previous year. Net income for the whole group was off 13.2 pct.

Squeeze Tactics—With the producers facing the prospect of still higher wage and other costs, this trend is expected to continue in 1952, unless price increases are allowed to compensate. At the moment, the government stand on prices leaves the industry little reason for optimism.

A 21.7 pct increase in net sales and operating revenue was more than offset by a 59.6 pct boost in Federal income taxes for the 27 companies which account for 90 pct of the nation's ingot capacity. Net income percent of sales dropped from an average of 8.0 pct in 1950 to 5.7 pct in 1951—a decline of 28.7 pct.

Stockholders Feel It, Too—Steel industry stockholders also felt the squeeze. Despite a 13.2 pct increase in the number of common shares outstanding, dividends declared dropped from $251.8 million in 1950 to $245.3 million in 1951, a decline of 2.6 pct. This happened at a time when the industry has more reason than ever to woo the stockholder, whose money is needed to help finance present and future expansion.

Funded debt rose 31.8 pct and invested capital was up 12.0 pct. These increases reflected the tremendous sums spent by the producers in expanding ingot capacity—an expansion encouraged by the government through accelerated tax amortization in the interest of national defense.

Consumers Anxious—Steel consumers faced the strike deadline with anxiety. A good many of them had inventories that looked comfortable at first glance. But close scrutiny showed these stocks to be far out of balance. Items in critical supply were expected to limit production, making it impossible to fully utilize items in heavy stock. For example, an auto maker felt little gratification over his big inventory of cold-rolled sheets because he had only enough bars and forging stock for a few days' operation.

Compounding the consumers' anxiety was the huge hand of government which was prepared to snatch the continuing trickle of steel production for high priority programs. The military was in line to get first crack at all tonnage as it became available.

During previous strikes warehouse steel has proved to be the ace-in-the-hole to keep many firms operating. But warehouse stocks, though gaining recently, are still far below normal. And the government is prepared to impound these stocks for delivery to priority customers.

Steelmaking operations this week are estimated at 41 pct of rated capacity, down 61 points from the previous week. The rate is based on assumption that there will be a strike. Companies started weaning blast furnaces at the end of last week. Early this week, as the faint hope for peace turned dimmer, they started shutting down openhearth furnaces wholesale. This precaution was to prevent undue damage to the furnace linings.

HOW THE *SCRAP* THAT JACK MADE —MADE JACK *AND MORE*

This is the Scrap that Jack made.

This is the Man who found the Scrap that Jack made.

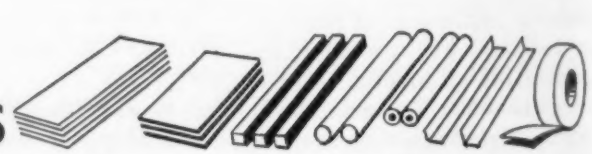
This is the Clerk who was called by the Man who found the Scrap that Jack made.

This is the Dealer who dealt with the Clerk who was called by the Man who found the Scrap that Jack made.

AND TO MAKE THE STORY SHORTER:

This is the jack the dealer paid for the Scrap that Jack made.

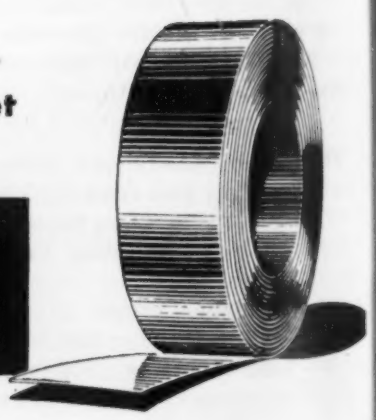
AND THIS IS THE STEEL THAT INDUSTRY GETS



from the Scrap that Jack made!

MORAL:

Check your Plant for Scrap Today and Get it Moving—*That* Pays Everybody!



Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

Market Briefs

Ore Hunt—Jones & Laughlin Steel Corp. announced that its subsidiary, Jalore Mining Co., Ltd., has acquired iron ore exploration options in four areas in southeastern Ontario, Canada. Options are on the north shore of Lake Ontario in Durham, Northumberland, and Frontenac Counties. J&L says there is indirect evidence of possible iron ore occurrences, warranting further examination. Surface geophysical investigations will be made this summer. Diamond drillings will follow should the preliminary investigations show promise.

New Date—Effective date of the recently announced import certification-delivery verification procedure for exports of strategic goods to 10 Western European countries has been extended from Apr. 7 to May 1, by the Office of International Trade. New procedure applies to exports of certain strategic goods to: Belgium, Denmark, France, Italy, Luxembourg, Norway, Portugal, United Kingdom, Western German, and The Netherlands. Affected commodities are identified in OIT's "Positive List" by the letter "A."

No Steel—National Production Authority last Monday shut off all mill and warehouse shipments of steel to exporters and manufacturers of consumer durables, including automobiles. Order became effective at once except that steel actually in transit was permitted to be accepted on delivery. It was not dependent upon outcome of strike negotiations, Administrator Henry H. Fowler said, but was issued to conserve declining production—because of the possible shutdown to assure that essential defense needs are met.

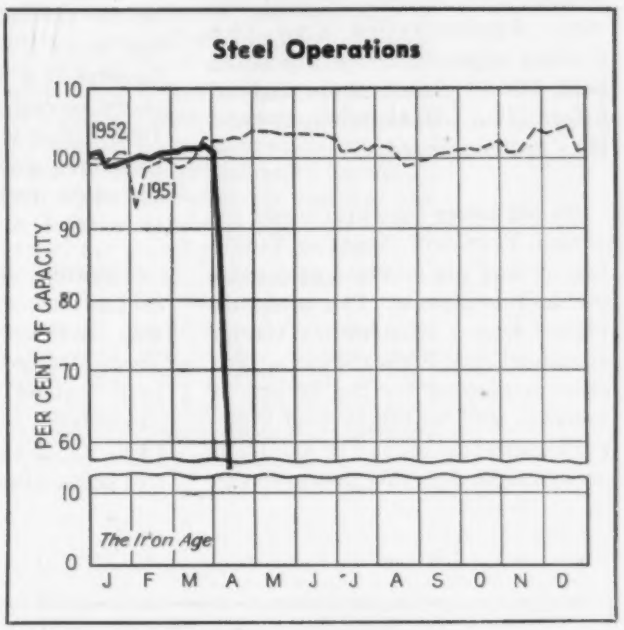
More Copper—Steady increase in the flow of scrap since November makes it likely that all second-quarter CMP orders for copper will be met, National Production Authority says. Meanwhile, the agency will try to bring the inventory position of brass mills, wire mills, and foundries into balance. One move toward this end has been to increase April allocations of refined copper to brass mills while reducing wire mill allotments.

Heavy Presses—In the table on heavy presses last week (Apr. 3, p. 85) two 18,000 ton forging presses were assigned to Wyman-Gordon Co. There should have been only one. It was built by Mesta Machine Co., and has been in operation for some time. The 50,000 ton forging press assigned to Aluminum Co. of America at Vernon, Calif., will be installed at Cleveland.

Tight Supply—Canada's steel supply situation remains tight with no indication of easing for the next 6 months, despite rumors of larger quantities from the U. S. The stepped-up defense program and increased steel demands for capital goods expansion will cut supplies for consumer goods. Plate, bars, sheets and structurals will be particularly tight. Base prices have not changed, but extras on galvanized sheets were revised Apr. 1. Overall price increased about 25¢ per 100 lb.

Price Rise—Mystic Iron Works of Boston and Everett, Mass., has announced an increase of $2.25 per ton for April, May and June. Prices are now $59.75 for foundry and $60.25 for malleable. The company said that "due to operating difficulties and resultant delays in scheduling March shipments, pig iron shipped during April to complete March orders will be billed at the first quarter price."

Wildcats—As the strike deadline grew near, the steelworkers became increasingly restless. In a few scattered plants the "holiday" spirit set in early, with workers jumping the gun by walking off their jobs ahead of schedule.



District Operating Rates—Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	West	Buffalo	Cleveland	Detroit	Wheeling	South	Ohio River	St. Louis	East	Aggregate
Mar. 30	105.0	104.5	102.0	100.0	101.5	104.0	99.0	104.0	101.0	102.0	94.0	84.0	118.0	102.0
Apr. 6	37.5	37.0	36.5	43.5	49.4	37.0	32.5	37.0	72.0	36.5	63.0	30.0	43.0	41.0†

Beginning Jan. 1, 1952, operations are based on annual capacity of 108,587,670 net tons.
† Tentative.

Delay Chile Strike Deadline

Anaconda strike postponed from Apr. 6 to Apr. 25 . . . Probable higher wages and high-price domestic contracts will form lever for bonus . . . Aluminum waits steel—*By R. L. Hatschek.*

Chilean labor unions seem to have taken a page from the United Steelworkers. They have postponed the threatened shutdown of Anaconda Copper Mining Co.'s Potrerillos and Chuquicamata mines to allow more bargaining time. Originally set for Apr. 6, the deadline is now Apr. 25. This method lends greater urgency to the tension of the whole situation and puts the union into the apparent position of having conceded to continue work in view of the international picture.

Yet another facet to the Chilean muddle is the bonus price being requested for the 20 pct of the copper output not already coming to the U. S. under present contract. Negotiations between General Services Administration and the Chilean representatives are being held behind closed doors and no information will be released until they are concluded.

Strong Lever—As previously reported, President Gonzolez Videla has offered his services as mediator in the dispute. The probable higher wages will form a strong argument for higher prices. Another argument for the 6¢ per lb increase will be the several high-price contracts signed by the U. S. government for the procurement of copper from sub-marginal domestic mines. This is sort of a reverse on the regular domestic producers who have argued that American copper should be worth the 27.50¢ that is already being paid for Chilean copper.

Aluminum Waits — Members of the aluminum producing industry are sitting tensely on the sidelines watching the steel labor tussle. Unfortunately for these producers, they will have to wait a steel settlement and then have the added weight of that settlement providing ammuniton for the union's demands.

The way things look in the steel dispute at present indicates that aluminum discussions will be held up for several weeks. Some thinking in the aluminum field is not so adverse to a wage hike—if a price increase can be had. After all, a 1952 dollar will buy more aluminum than a 1939 dollar could and the light metal is more critical than steel.

Titanium Doings—One new titanium firm was born and another was conceived during the past week. Titanium Co. of America has been formed as a wholly owned subsidiary of the Christiansen Corp. of Chicago. The Glidden Co. and Bohn Aluminum & Brass Corp. announced the pooling of their individual titanium research and a new jointly owned firm may well result from the action.

Ticoa, as the new firm will probably be labeled, will go into the manufacture of wrought titanium products. Main endeavor of the Glidden-Bohn venture will be the development of a cheaper and better method for the production of the raw metal. Research will also include fabrication methods for the metal and its alloys.

Big Bandwagon — With these firms added to those already devoted to the production of the "new" metal even more rapid development of techniques is assured. No metal has ever mushroomed with the rapidity of titanium. Despite all the technological hurdles one thing seems assured—there won't be any Justice Dept. anti-trust suits when the metal finally attains truly commercial proportions.

The aluminum industry has frequently butted its head on this problem and the magnesium industry, with only one private producer, may yet run into similar trouble as that metal grows to major proportions.

Tin Tussling — Sen. Lyndon Johnson of the Senate Preparedness Subcommittee got in a few more words on the tin situation last week. He warned Reconstruction Finance Corp. against inserting any sort of subsidies into tin contracts with foreign producers. He stressed a ceiling of $1.18 per lb as the top buying price and indicated that it may even be unnecessary to make any further tin purchasing agreements at the present time.

The Senator made no specific mention of the Bolivian producers with whom RFC is now negotiating but it was an obvious reiteration that U. S. taxpayers would stand for no gouging on tin prices. Bolivians say they may now be forced into a bad contract because of the Senator's actions.

NONFERROUS METAL PRICES

	Apr. 2	Apr. 3	Apr. 4	Apr. 5	Apr. 7	Apr. 8
Copper, electro, Conn.	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake delivered	24.625	24.625	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.215	$1.215	$1.215	....	$1.215	$1.215
Zinc, East St. Louis	19.50	19.50	19.50	19.50	19.50	19.50
Lead, St. Louis	18.80	18.80	18.80	18.80	18.80	18.80

Note: Quotations are going prices.

What is zinc?

dreds of times
Zilla (zĭl′ȧ), *n.* [N
thorny brassicaceous plants of
ern Africa. The leaves of *Z. myagroides*
deserts, are boiled and eaten by Arabs.
zimb (zĭmb; zĭm), *n.* [Abyssinian (Amharic) *zĭnb*
two-winged
native of Abyssinia, allied to the
of flat form and fine quality, obtained from the Adriatic,
about the Greek islands, and the coast of Barbary.
zinc (zĭŋk), *n.* [G. *zink*, prob. akin to *zinn* tin: cf. F. *zinc*, fr. G. Cf. TIN.] **1.** *Chem.* **A bluish white crystalline metallic element, brittle when cold, malleable at 120–150° C. (250–300° F.), and very brittle at 200° C. It is practically unaffected by air and moisture at ordinary temperatures. Symbol, *Zn*; at. wt., 65.37.**
Zinc melts at 420° C. (788° F.). At about 930° C. it boils, yielding vapors which burn in air, forming the oxide. Sp. gr. of zinc, 7–7.2. Weight of a cubic foot, 437–450 lbs.

WHILE the above description of metallic zinc is basic, it tells the layman nothing of the manifold and highly essential functions this versatile engineering material performs. For zinc is frequently used in conjunction with other metals, and then its identity may be more or less concealed. For example, the great volume of iron and steel products which are galvanized, i.e., zinc coated, as protection against corrosion has for many years accounted for the metal's largest single use — averaging over 40% of the total annual slab zinc consumption in the United States. In brass, of which it is an essential constituent, the zinc is invisible. Zinc oxide, which is particularly important as a paint pigment and as a rubber ingredient, is a fine, white powder which gives no hint of its relationship to the base product.

The die casting industry, a comparatively young but vigorous newcomer in the field, is steadily gaining on galvanizers as the chief outlet for zinc — accounting for more than 30% of total annual consumption. Zinc alloy die castings are used for many structural parts in the automotive, electric appliance, and business machine industries. Since zinc base die castings are often covered with a great variety of beautiful finishes for decorative purposes, the metal's identity is again concealed. For example, the average individual probably does not realize that most of the plated parts on modern automobiles and household appliances are zinc die castings.

Die castings are produced from six basic metals: tin, lead, zinc, copper, aluminum and magnesium. Zinc, by far, accounts for the major tonnage chiefly because of its low melting point, easy castability, dimensional stability of the casting and its adaptability to a wide variety of finishes.

Eastern Sales Agents: ST. JOSEPH LEAD CO., 250 PARK AVE., NEW YORK 17

Bunker Hill Zinc 99.99+%

Sales Office for Pacific Coast: NORTHWEST LEAD CO., SEATTLE, WASH.

Nonferrous Prices

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.188 in., 2S, 3S, 30.1¢; 4S, 61S-O, 32¢; 52S, 34.1¢; 24S-O, 24S-OAL, 32.9¢; 75S-O, 75S-OAL, 39.9¢; 0.081 in., 2S, 3S, 31.2¢; 4S, 61S-O, 33.5¢; 52S, 35.6¢; 24S-O, 24S-OAL, 34.1¢; 75S-O, 75S-OAL, 41.8¢; 0.032 in., 2S, 3S, 32.9¢; 4S, 61S-O, 37.1¢; 52S, 39.8¢; 24S-O, 24S-OAL, 41.7¢; 75S-O, 75S-OAL, 52.2¢.

Plate ¼ in. and heavier: 2S, 3S-F, 28.3¢; 4S-F, 30.2¢; 52S-F, 31.8¢; 61S-O, 30.8¢; 24S-O, 24S-OAL, 32.4¢; 75S-O, 75S-OAL, 38.8¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.2¢ to 74.5¢; 12 to 14, 36.9¢ to 89¢; 24 to 26, 39.6¢ to $1.16; 36 to 38, 47.2¢ to $1.70.

Rod, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 37.5¢ to 33.5¢; cold finished, 0.375 to 3 in., 2S-F, 3S-F, 40.5 to 35¢.

Screw Machine Stock: Rounds, 11S-T3, ⅛ to 11/32 in., 53.5¢ to 42¢; ⅜ to 1½ in., 41.5¢ to 39¢; 1 9/16 to 3 in., 38.5¢ to 36¢; 17S-T4 lower by 1.5¢ per lb. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in., 2S, 39.5¢ to 29¢; 52S, 48¢ to 35¢; 56S, 51¢ to 42¢; 17S-T4, 54¢ to 37.5¢; 61S-T4, 48.5¢ to 37¢; 75S-T6, 84¢ to 67.5¢.

Extruded Tubing, Rounds: 63S-ST-5, OD in in.: 1¼ to 2, 37¢ to 54¢; 2 to 4, 33.5¢ to 45.5¢; 4 to 6, 34¢ to 41.5¢; 6 to 9, 34.5¢ to 43.5¢.

Roofing Sheet, Flat: 0.019 in. x 28 in. per sheet, 72 in., $1.42; 96 in., $1.522; 120 in., $1.902; 144 in., $2.284. Gage 0.24 x 28 in., 72 in., $1.379; 96 in., $1.839; 120 in., $2.299; 144 in., $2.759. **Coiled Sheet:** 0.019 in. x 28 in., 28.2¢ per lb; 0.024 in. x 28 in., 26.9¢ lb.

Magnesium

(F.O.B. mill, freight allowed)

Sheet and Plate: FS1-O, ¼ in., 63¢; 3/16 in., 65¢; ⅛ in., 67¢; B & S Gage 10, 68¢; 12, 72¢. Specification grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam in., ¼ to 0.311 in., 74¢; ½ to ¾ in., 57.5¢; 1¼ to 1.749 in., 53¢; 2½ to 5 in., 48.5¢. Other alloys higher. Base up to ¾ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes, Rectangles: M. In weight per ft, for perimeters less than size indicated, 0.10 to 0.11 lb, 3.5 in., 62.3¢; 0.22 to 0.25 lb, 5.9 in., 59.3¢; 0.50 to 0.59 lb, 8.6 in., 56.7¢; 1.8 to 2.59 lb, 19.5 in., 53.8¢; 4 to 6 lb, 28 in., 49¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb, ½ to 1.80 lb, 20,000 lb; 1.80 and heavier, 30,000 lb.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057; ¼ in. to 5/16, $1.40; 5/16 to ⅜, $1.26; ½ to ⅝, 93¢; 1 to 2 in., 76¢; 0.165 to 0.219, ⅝ to ¾, 61¢; 1 to 2 in., 57¢; 3 to 4 in., 56¢. Other alloys higher. Base, OD in in.: Up to 1½ in., 10,000 lb; 1½ in. to 3 in., 20,000 lb; 3 in. and larger, 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel and Monel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel
Sheets, cold-rolled	77	60½
Strip, cold-rolled	83	63½
Rods and bars	73	58½
Angles, hot-rolled	73	58½
Plates	75	59½
Seamless tubes	106	93½
Shot and blocks	..	53½

Copper, Brass, Bronze

(Freight prepaid on 200 lb)

	Sheet	Rods	Extruded Shapes
Copper	41.68	....	41.28
Copper, h-r	....	37.53	....
Copper, drawn	....	38.78	....
Low brass	39.67	39.36	....
Yellow brass	38.28	37.97	....
Red brass	40.14	39.83	....
Naval brass	43.20	37.26	38.52
Leaded copper	....	41.58	....
Com'l bronze	41.13	40.82	....
Mang. bronze	46.92	40.81	42.37
Phos. bronze	61.07	61.32	....
Muntz metal	41.18	36.74	37.99
Ni silver, 10 pct	49.82	52.04	....

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	19.00
Aluminum pig	18.00
Antimony, American, Laredo, Tex.	50.00
Beryllium copper, 3.75-4.25% Be	1.56
Beryllium aluminum 5% Be, Dollars per lb contained Be	$69.00
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.55
Cobalt, 97-99% (per lb)	$2.40 to $2.47
Copper, electro, Conn. Valley	24.50
Copper, Lake, delivered	24.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium dollars per troy oz.	$200
Lead, St. Louis	18.80
Lead, New York	19.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb.	24.50
Magnesium, sticks, 100 to 500 lb.	42.00 to 44.00
Mercury, dollars per 76-lb. flask, f.o.b. New York	$207 to $210
Nickel electro, f.o.b. N. Y. warehouse	59.58
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	52.75
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$90 to $93
Silver, New York, cents per oz.	88.00
Tin, New York	$1.215
Titanium, sponge	$5.00
Zinc, East St. Louis	19.50
Zinc, New York	20.20
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb, delivered carloads)

85-5-5-5 ingot	
No. 115	27.25
No. 120	26.75
No. 123	26.25
80-10-10 ingot	
No. 305	33.00
No. 315	30.50
88-10-2 ingot	
No. 210	41.50
No. 215	40.00
No. 245	34.50
Yellow ingot	
No. 405	23.25
Manganese bronze	
No. 421	30.50

Aluminum Ingot

(Cents per lb, 10,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	20.6
0.60 copper, max.	20.4
Piston alloys (No. 122 type)	21.2
No. 12 alum. (No. 2 grade)	19.5
108 alloy	20.6
195 alloy	20.8
13 alloy	20.8
ASX-679	20.5

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-97½%	18.80
Grade 2—92-95%	18.60
Grade 3—90-92%	18.40
Grade 4—85-90%	18.20

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	37.84
Electrodeposited	33⅜
Flat rolled	38.34
Forged ball anodes	43
Brass, 80-20	
Cast, oval, 15 in. or longer	34¾
Zinc, oval	26½
Ball anodes	25½
Nickel 99 pct plus	
Cast	76.00
Rolled, depolarized	77.00
Cadmium	$2.80
Silver 999 fine, rolled, 100 oz lots, per troy oz., f.o.b. Bridgeport, Conn.	97½

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	20½
Nickel chloride, 375 lb drum	27½
Silver cyanide, 100 oz lots, per oz.	67¼
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	47.7

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add ½¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	21½	20¾
Yellow brass	19½	17¾
Red brass	20½	19¾
Comm. bronze	20½	19¾
Mang. bronze	18½	17¾
Brass rod ends	18¾	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
Refinery brass	17.25*
Radiators	14.75

* Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
No. 1 composition	18.50
No. 1 comp. turnings	18.25
Rolled brass	15.50
Brass pipe	16.50
Radiators	14.75
Aluminum	
Mixed old cast	9.75
Mixed new clips	11.00
Mixed turnings, dry	9.50
Pots and pans	9.25

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 heavy copper and wire	18¾—19¼
No. 2 heavy copper and wire	17¼—17¾
Light copper	16 —16½
New type shell cuttings	16 —16½
Auto radiators (unsweated)	14¼—14¾
No. 1 composition	18 —18½
No. 1 composition turnings	17¾—18
Unlined red car boxes	16¾—17¼
Cocks and faucets	15½—16
Mixed heavy yellow brass	12 —12½
Old rolled brass	15 —15½
Brass pipe	16 —16½
New soft brass clippings	16 —16½
Brass rod ends	15½—16
No. 1 brass rod turnings	15 —15½
Aluminum	
Alum. pistons and struts	6½— 7½
Aluminum crankcases	7½— 8
2S aluminum clippings	10½
Old sheet and utensils	7½— 8
Borings and turnings	5 — 6
Misc. cast aluminum	7½— 8
Dural clips (24S)	7½— 8
Zinc	
New zinc clippings	13¼—13½
Old zinc	10 —10¼
Zinc routings	6¾— 7
Old die cast scrap	6¾— 7
Nickel and Monel	
Pure nickel clippings	35 —36
Clean nickel turnings	35 —36
Nickel anodes	35 —36
Nickel rod ends	35 —36
New Monel clippings	28 —29
Clean Monel turnings	20 —21
Old sheet Monel	28 —29
Nickel silver clippings, mixed	13 —14
Nickel silver turnings, mixed	12 —13
Lead	
Soft scrap, lead	15¾—16
Battery plates (dry)	10 —10½
Batteries, acid free	7 — 7¼
Magnesium	
Segregated solids	15 —16
Castings	14 —15
Miscellaneous	
Block tin	100 —110
No. 1 pewter	80
No. 1 auto babbitt	60
Mixed common babbitt	16¼—16½
Solder joints	22 —23
Siphon tops	60
Small foundry type	21 —22
Monotype	18½—19
Lino. and stereotype	17½—18
Electrotype	16 —16½
Hand picked type shells	10 —11
Lino. and stereo. dross	8¾— 9
Electro. dross	7½— 8

Half a cupful...

can sink a boat

Power boat skippers don't frighten easily.

Yet they're scared stiff of gasoline seepage. "It's dynamite," they tell you, "—half a cupful can blow your boat to 'Kingdom Come'."

So they put boat builders right on the spot when it comes to gas tanks.

They want tanks made of metal that sea air, bilge, or gasoline won't corrode . . . metal that's easy to fabricate, to weld gas-tight . . . metal that doesn't form sludge that "gums up" fuel lines and leaves you going nowheres, slow.

Now that's a mighty tall order.

But boat builders filled it. Filled it with a metal that satisfies *their* demands . . . and the strict requirements of the Yacht Safety Bureau. Filled it with a metal that qualifies in every respect for gas tanks, among stock boat builders.

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Wait for the Gates to Close on Scrap

Shipments narrow down . . . Some mills plan to halt shipments if strike hits . . . Twilight scrap activity indicated . . . NPA had reportedly postponed blast at mill scrap take slow-up.

The scrap industry early this week was waiting for the gates to close on scrap shipments because of a steel strike. The stubborn clinging to hopes that industry-union "bargaining" would forestall a strike was seen by many as wishful thinking. In the words of one prominent broker, the scrap situation would turn "lousy" if a strike hit. It seemed that the best the scrap trade could hope for was a strike of short duration.

Early this week and late last week scrap shippers felt the effects of strike imminence. One large consumer mailed instructions that scrap shipments would be halted in the event of a strike. Others were narrowing down shipments, taking in only choice openhearth grades.

The truth was evident to the trade: Scrap movement would be substantially lowered during a strike. Some possibility existed of a few mills storing good scrap in dealers' yards. The extent of this stockpiling would depend on yard space and would not be practical for a long strike.

Until consumers started to slow down shipments in expectation of a strike, flow of scrap had been on the upswing as dealers and brokers pushed orders to beat the fall of the axe.

It was indicated that near-certainty of a steel strike has postponed a blast from National Production Authority that consumers were not doing enough to encourate scrap collections through aggressive buying. NPA wrath was reportedly stirred by its exertions on behalf of the scrap cause while mills tempered their buying. This gave the impression that the scrap shortage was licked, it's said, while NPA was ballyhooing the desperate scrap crisis. The NPA blast is merely postponed.

Pittsburgh — In anticipation of a steel strike, most mills in this area have held up shipments of scrap. A few others have made plans to accept shipments at points outside the plant gates. As a result, movements have slowed appreciably, although yards will continue to take in material for prompt shipment when the wage-price dispute is finally settled. Meanwhile, an appraisal of the cast market indicates a further decline in the price of cupola grade. Not much cast is moving.

Chicago—Shipments to some mills were being stopped last week as steel drew in its belt for the expected strike. Rejects were still being made in the steelmaking grades of scrap. Openhearth and electric furnace grades were moving well. Spring boards have been dropping in some grades, particularly on short shovelings and machine shop turnings. Cast was still sinking, though some dealers were refusing to sell.

Philadelphia—The scrap trade here is marking time waiting for the steel strike. One large out-of-district consumer sent form letters instructing shippers to hold scrap in the event of a strike and another ordered a hold-up of blast furnace grades only. District mills have sent no instructions as yet but at least three are assured of continued operations. Prices on openhearth grades are holding but would probably drop in the event of a long strike. Cast continues slow.

New York—Buying began to narrow down to choice openhearth grades this week before strike deadline. The trade held out some hope for a steel settlement but it was wishful thinking. Until the scrap deadline had begun to squeeze shipments, scrap movement was good. A few of the smaller consumers were expected to buy through a strike. Mill storing of scrap in dealers' yards is not feasible to a great extent in this district because of limited space.

Detroit — Accelerated production quotas for the second quarter have not resulted in an appreciable increase in scrap generated by the automobile companies. As a result the slow movement that has characterized the Detroit scrap market for some time continues. One large dealer believes that Detroit is diminishing its position of a plus scrap area as steel mill demand increases while the supply loses ground.

Cleveland—With a strike almost certain at the beginning of the week one major consumer has notified dealers to hold up shipments as soon as a strike took place. However, industrial and railroad scrap shipped directly from producers would continue to be taken in. Dealers shipped heavily last week and early this week to beat the deadline. Some speculated that a long strike might strengthen the cast market as foundries were cut off from pig.

St. Louis—With a steel strike in prospect, the market for scrap is at a standstill. Mills are making no further commitments, and are asking that shipments be withheld to avoid demurrage charges if a strike should prevent them from using the material. Warmer weather has helped collections, but country dealers are not offering, fearing a strike.

Birmingham — Scrap dealers and brokers here are sweating out the expected steel strike. Mills are also apprehensive, and ordered all scrap shipments held up after last Monday. Brokers have called in all buyers.

Cincinnati — In anticipation of a strike one consumer here held up all shipments of dealer, railroad, and industrial scrap as of late last week. Another not affected in all plants was expected to continue taking in shipments. Shipments to consumers out of the area were due to fall off as steel companies had sent instructions to hold up shipments when a strike hit.

Boston — Openhearth grades continue in strong demand, though at the moment the big interest is in the outcome of the steel strike. Cupola cast and stove plate remain below the ceiling and are in light demand.

Buffalo — Two of three leading mills suspended scrap shipments in view of a strike's imminence. Similar notice was expected from the third. Dealers report scrap supplies expanding. Cast stays weak.

Official Air Force photo, released by Dept. of Defense

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Iron and Steel

SCRAP PRICES

(Maximum basing point prices, per gross ton, as set by OPS in CPR 5 and amendments. Shipping point and delivered prices calculated as shown below.)

Switching Charge (Dollars per gross ton) →		Pittsburgh $0.90	Johnstown .75	Brackenridge .63	Butler .65	Midland .75	Monessen .51	Sharon .75	Youngstown .75	Canton .51	Steubenville .51	Warren .75	Weirton .70	Cleveland .76	Buffalo .83	Cincinnati .65	Middletown .26	Chicago 1.34	Claymont .75	Coatesville .60	Conshohocken .20	Harrisburg .51	Phoenixville .51	Sparrows Pt. .20	Bethlehem .62	Ashland, Ky. .47	Kokomo, Ind. .51	Portsmouth, O. .51	St. Louis .61	Detroit .96	Duluth .50	Kansas City .76	Birmingham .50	Alabama City .43	Atlanta .51	Minneapolis .33	Houston .57	Los Angeles .68	Pittsburg, Cal. .82	Portland, Ore. .88	San Francisco .88	Seattle .88
Basing Points →																																								
GRADES	OPS No.																																							
No. 1 bundles	1	$44.00			$44.00				$43.00					$42.50				$42.00						$41.00	$41.15	$40.00	$39.50	$39.00	$38.00	$37.00	$35.00									
No. 1 busheling	2	44.00			44.00				43.00					42.50				42.00						41.00	41.15	40.00	39.50	39.00	38.00	37.00	35.00									
No. 1 heavy melting	3	43.00			43.00				42.00					41.50				41.00						40.00	40.15	39.00	38.50	38.00	37.00	36.00	34.00									
No. 2 heavy melting	4	43.00			43.00				42.00					41.50				41.00						40.00	40.15	39.00	38.50	38.00	37.00	36.00	34.00									
No. 2 bundles	5	43.00			43.00				42.00					41.50				41.00						40.00	40.15	39.00	38.50	38.00	37.00	36.00	34.00									
Machine shop turnings	6	34.00			34.00				33.00					32.50				32.00						31.00	31.15	30.00	29.50	29.00	28.00	27.00	25.00									
Mixed borings and turnings	7	38.00			38.00				37.00					36.50				36.00						35.00	35.15	34.00	33.50	33.00	32.00	31.00	29.00									
Shoveling turnings	8	38.00			38.00				37.00					36.50				36.00						35.00	35.15	34.00	33.50	33.00	32.00	31.00	29.00									
Cast iron borings	10	38.00			38.00				37.00					36.50				36.00						35.00	35.15	34.00	33.50	33.00	32.00	31.00	29.00									
No. 1 chemical borings	26	41.00			41.00				40.00					39.50				39.00						38.00	38.15	37.00	36.50	36.00	35.00	34.00	32.00									
Forge crops	11	51.50			51.50				50.50					50.00				49.50						48.50	48.65	47.50	47.00	46.50	45.50	44.50	42.50									
Bar crops and plate	12	49.00			49.00				48.00					47.50				47.00						46.00	46.15	45.00	44.50	44.00	43.00	42.00	40.00									
Punchings and plate	14	46.50			46.50				45.50					45.00				44.50						43.50	43.65	42.50	42.00	41.50	40.50	39.50	37.50									
Electric furnace bundles	15	46.00			46.00				45.00					44.50				44.00						43.00	43.15	42.00	41.50	41.00	40.00	39.00	37.00									
Cut struct., plate, 3 ft and less	16	47.00			47.00				46.00					45.50				45.00						44.00	44.15	43.00	42.50	42.00	41.00	40.00	38.00									
Cut struct., plate, 2 ft and less	17	49.00			49.00				48.00					47.50				47.00						46.00	46.15	45.00	44.50	44.00	43.00	42.00	40.00									
Cut struct., 1 ft and less	18	50.00			50.00				49.00					48.50				48.00						47.00	47.15	46.00	45.50	45.00	44.00	43.00	41.00									
Foundry steel, 2 ft and less	20	44.00			44.00				43.00					42.50				42.00						41.00	41.15	40.00	39.50	39.00	38.00	37.00	35.00									
Foundry steel, 1 ft and less	21	46.00			46.00				45.00					44.50				44.00						43.00	43.15	42.00	41.50	41.00	40.00	39.00	37.00									
Heavy trimmings	24	43.00			43.00				42.00					41.50				41.00						40.00	40.15	39.00	38.50	38.00	37.00	36.00	34.00									
No. 1 RR heavy melting	RR 1	46.00			46.00				45.00					44.50				44.00						43.00	43.15	42.00	41.50	41.00	40.00	39.00	37.00									
Scrap rails, random lengths	RR 14	48.00			48.00				47.00					46.50				46.00						45.00	45.15	44.00	43.50	43.00	42.00	41.00	39.00									
Scrap rails, 3 ft and less	RR 16	51.00			51.00				50.00					49.50				49.00						48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00									
Scrap rails, 2 ft and less	RR 17	52.00			52.00				51.00					50.50				50.00						49.00	49.15	48.00	47.50	47.00	46.00	45.00	43.00									
Scrap rails, 18 in. and less	RR 18	54.00			54.00				53.00					52.50				52.00						51.00	51.15	50.00	49.50	49.00	48.00	47.00	45.00									
Rerolling rails	RR 15	53.00			53.00				52.00					51.50				51.00						50.00	50.15	49.00	48.50	48.00	47.00	46.00	44.00									
Uncut tires	RR 20	48.00			48.00				47.00					46.50				46.00						45.00	45.15	44.00	43.50	43.00	42.00	41.00	39.00									
Cut tires	RR 21	51.00			51.00				50.00					49.50				49.00						48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00									
Cut bolsters and side frames	RR 23	49.00			49.00				48.00					47.50				47.00						46.00	46.15	45.00	44.50	44.00	43.00	42.00	40.00									
RR specialties	RR 24, 28, 29	51.00			51.00				50.00					49.50				49.00						48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00									
Solid steel axles	RR 25	58.00			58.00				57.00					56.50				56.00						55.00	55.15	54.00	53.50	53.00	52.00	51.00	49.00									
No. 3 steel wheels	RR 27	51.00			51.00				50.00					49.50				49.00						48.00	48.15	47.00	46.50	46.00	45.00	44.00	42.00									
Unassorted	RR 35	40.00			40.00				39.00					38.50				38.00						37.00	37.15	36.00	35.50	35.00	34.00	33.00	31.00									

Cast Scrap Ceilings

Prices set by CPR 5, OPS

(F.o.b. all shipping points)

Grades	OPS No.	
Cupola cast	1	$49.00
Charging box cast	2	47.00
Heavy breakable cast	3	45.00
Cast iron brake shoes	5	41.00
Stove plate	6	46.00
Clean auto cast	7	52.00
Unstripped motor blocks	8	43.00
Cast iron carwheels	9	47.00
Malleable	10	55.00
Drop broken mach'y cast	11	52.00

Ceiling price of clean cast iron foundry runout or prepared cupola drops is 75 pct of corresponding grade.

Cast Prices

(Below-Ceiling Prices at Some Districts)

PITTSBURGH
(Delivered)

Drop broken mach'y cast	$52.50 to $53.00
Cupola cast	45.00 to 46.00
Heavy breakable	45.50 to 46.00

CHICAGO
(Delivered)

Cupola cast	$43.00 to $45.00
Stove plate	39.00 to 40.50
Heavy breakable	42.00 to 43.00
Drop broken machinery	46.00 to 48.00
Unstripped motor blocks	35.00 to 37.00
Charging box cast	43.00 to 45.00
Clean auto cast	46.00 to 47.00

PHILADELPHIA
(Delivered)

Cupola cast	$47.00 to $49.00
Heavy breakable	45.00
Clean auto cast	53.00 to 54.00
Unstripped motor blocks	39.00 to 40.00

CLEVELAND
(Delivered)

Unstripped motor blocks	$40.00 to $41.00

BIRMINGHAM
(Delivered)

Cupola cast	$41.00 to $42.00
Stove plate	39.00 to 40.00
Charging box cast	39.00 to 40.00
Heavy breakable	36.00 to 37.00
Drop broken machinery	41.00 to 42.00
Unstripped motor blocks	36.00 to 37.00

ST. LOUIS
(Delivered)

Heavy breakable	$45.00
Stove plate	42.00

NEW YORK
(Brokers' buying prices)

Drop broken machinery	$49.50 to $50.50
Mixed yard cast	44.00 to 45.00
Charging box cast	43.00 to 44.00
Heavy breakable	42.50 to 43.50
Unstripped motor blocks	35.00

BOSTON
(Brokers' buying prices)

Cupola cast	$45.00
Stove plate	42.00 to 43.00
Unstripped motor blocks	35.00

DETROIT
(Brokers' buying prices)

Cupola cast	$46.00
Charging box	45.00
Heavy breakable	43.00
Cast iron brake shoes	39.00
Stove plate	44.00
Unstripped motor blocks	40.00
Drop broken machinery cast	50.00

CINCINNATI
(Delivered)

Unstripped motor blocks	$40.00
Stove plate	45.00
Clean auto cast	47.00

BUFFALO
(F.o.b. shipping point)

Cupola cast	$47.00 to $48.00

SAN FRANCISCO
(Delivered)

Cupola cast	$42.00

LOS ANGELES
(Delivered)

Cupola cast	$46.00

SEATTLE
(Delivered)

Cupola cast	$36.50
Heavy breakable	32.00

SHIPPING POINT PRICES (Except RR scrap) —for shipping points within basing points, the ceiling shipping point price is the basing point price, less switching charge. The ceiling for shipping points outside basing points is the basing point price yielding the highest shipping point price, less the lowest established freight charge. Dock charge, where applicable, is $1.25 per gross ton except: Memphis, 95¢; Great Lakes ports, $1.50¢, and New England ports, $1.75. Maximum shipping point price on No. 1 bundles (prime grade) in New York City is $36.99 per gross ton with set differentials for other grades. Hudson and Bergen County, N. J., shipping point prices are computed from Bethlehem basing point. All New Jersey computations use all-rail transport. Cast scrap shipping point prices are given in table.

CEILING INTRANSIT PREPARATION CHARGES (Dollars per gross ton)

No. 1 heavy; No. 2 heavy; No. 1 RR heavy; No. 2 RR heavy; No. 1 busheling; No. 2 bundles; electric furnace bundles	$8.00
No. 1 bundles; briquetted turnings or cast iron borings; No. 1 RR sheet scrap	6.00
Crushing machine shop turnings	3.00
Bar crops and plate, cast steel, punchings and plate, cut structural and plate; 3 ft and under, foundry steel, 2 ft and under, wrought iron	10.00
Structural, plate scrap, 2 ft and less, foundry steel 1 ft and less	11.00
Structural and plate scrap, 1 ft and less	12.00
Rails, 3 ft & less; cut tires; cut bolsters & side frames	4.00
Rails, 2 ft & less	5.00
Rails, 18 in. & less	7.00

Hamilton, Ontario

(Consumers buying prices, del'd gross ton)

Hvy. melting steel	$35.00
No. 1 bundles	35.00
No. 2 bundles	34.50
Mechanical bundles	33.00
Mixed, steel scrap	31.00
Rails, remelting	35.00
Rails, rerolling	33.00
Bushelings	30.00
Bushelings, prepared new factory	33.00
Bushelings, unprepared new factory	23.00
Short steel turnings	32.00
Mixed borings, turnings	32.00
Cast scrap	50.00

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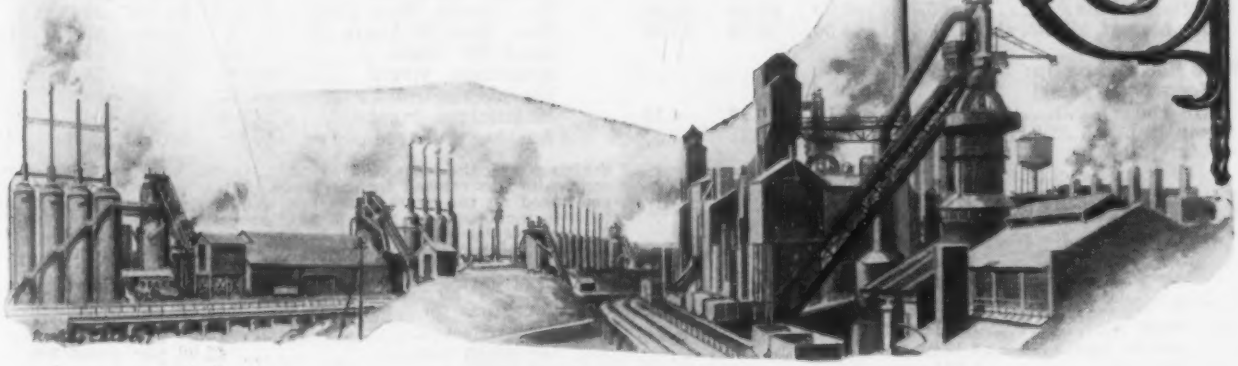

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	SEATTLE, WASH.	

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Apr. 8, 1952	Apr. 1, 1952	Mar. 11, 1952	Apr. 10, 1951
Hot-rolled sheets	3.60	3.60	3.60	3.60
Cold-rolled sheets	4.35	4.35	4.35	4.35
Galvanized sheets (10 ga)	4.80	4.80	4.80	4.80
Hot-rolled strip	3.50	3.50	3.50	3.50
Cold-rolled strip	4.75	4.75	4.75	4.75
Plate	3.70	3.70	3.70	3.70
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R strip (No. 302)	36.75	36.75	36.75	36.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb.) cokes	$8.70	$8.70	$8.70	$8.70
Tinplate, electro (0.50 lb.)	7.40	7.40	7.40	7.40
Special coated mfg. ternes	7.50	7.50	7.50	7.50
Bars and Shapes: (cents per pound)				
Merchant bars	3.70	3.70	3.70	3.70
Cold finished bars	4.55	4.55	4.55	4.55
Alloy bars	4.30	4.30	4.30	4.30
Structural shapes	3.65	3.65	3.65	3.65
Stainless bars (No. 302)	31.50	31.50	31.50	31.25
Wrought iron bars	9.50	9.50	9.50	9.50
Wire (cents per pound)				
Bright wire	4.85	4.85	4.85	4.85
Rails (dollars per 100 lb)				
Heavy rails	$3.60	$3.60	$3.60	$3.60
Light rails	4.00	4.00	4.00	4.00
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$56.00	$56.00	$56.00	$56.00
Slabs, rerolling	56.00	56.00	56.00	56.00
Forging billets	66.00	66.00	66.00	66.00
Alloy blooms, billets, slabs	70.00	70.00	10.00	70.00
Wire Rod and Skelp: (cents per pound				
Wire rods	4.10	4.10	4.10	4.10
Skelp	3.35	3.35	3.35	3.35

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Pig Iron: (per gross ton)	Apr. 8, 1952	Apr. 1, 1952	Mar. 11, 1952	Apr. 10, 1951
Foundry, del'd Phila.	$57.97	$57.97	$57.97	$57.77
Foundry, Valley	52.50	52.50	52.50	52.50
Foundry, Southern, Cin'ti	55.58	55.58	55.58	55.58
Foundry, Birmingham	48.88	48.88	48.88	48.88
Foundry, Chicago†	52.50	52.50	52.50	52.50
Basic, del'd Philadelphia	57.09	57.09	57.09	56.92
Basic, Valley furnace	52.00	52.00	52.00	52.00
Malleable, Chicago†	52.50	52.50	52.50	52.50
Malleable, Valley	52.50	52.50	52.50	52.50
Charcoal, Chicago	70.56	70.56	70.56	70.56
Ferromanganese‡	186.25	186.25	186.25	186.25

†The switching charges for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy pages.

Scrap: (per gross ton)	Apr. 8, 1952	Apr. 1, 1952	Mar. 11, 1952	Apr. 10, 1951
No. 1 steel, Pittsburgh	$43.00*	$43.00*	$43.00*	$44.00*
No. 1 steel, Phila. area	41.50*	41.50*	41.50*	42.50*
No. 1 steel, Chicago	41.50*	41.50*	41.50*	42.50*
No. 1 bundles, Detroit	41.15*	41.15*	41.15*	41.15*
Low phos., Young'n	46.50*	46.50*	46.50*	46.50*
No. 1 cast, Pittsburgh	*45.50*‡	49.75‡	49.75‡	49.00†
No. 1 cast, Philadelphia	*48.00*‡	48.50‡	50.25‡	49.00†
No. 1 cast, Chicago	*44.00*‡	44.50‡	48.50‡	49.00†

* Basing Pt. † Shipping Pt. ‡ Del'd., includes broker's fee. Not including broker's fee after Feb. 7, 1951.

Coke: Connellsville: (per net ton at oven)	Apr. 8, 1952	Apr. 1, 1952	Mar. 11, 1952	Apr. 10, 1951
Furnace coke, prompt	$14.75	$14.75	$14.75	$14.75
Foundry coke, prompt	17.75	17.75	17.75	17.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	24.50	24.50	24.50	24.50
Copper, Lake, Conn.	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.215	$1.215	$1.215	$1.505
Zinc, East St. Louis	19.50	19.50	19.50	17.50
Lead, St. Louis	18.80	18.80	18.80	16.80
Aluminum, virgin	19.00	19.00	19.00	19.00
Nickel, electrolytic	59.58	59.58	59.58	53.55
Magnesium, ingot	24.50	24.50	24.50	24.50
Antimony, Laredo, Tex.	50.00	50.00	50.00	42.00

Composite Prices

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1934 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 139 of May 12, 1949, issue.

	Finished Steel Base Price	Pig Iron	Scrap Steel
Apr. 8, 1952	4.131¢ per lb.	$52.72 per gross ton	$42.00 per gross ton
One week ago	4.131¢ per lb.	52.72 per gross ton	42.00 per gross ton
One month ago	4.131¢ per lb.	52.72 per gross ton	42.00 per gross ton
One year ago	4.131¢ per lb.	52.69 per gross ton	43.00 per gross ton

	Finished Steel Base Price High	Finished Steel Base Price Low	Pig Iron High	Pig Iron Low	Scrap Steel High	Scrap Steel Low
1952	4.131¢ Jan. 1	4.131¢ Jan. 1	$52.72 Jan. 1	$52.72 Jan. 1	$42.00 Jan. 1	$42.00 Jan. 1
1951	4.131¢ Jan. 2	4.131¢ Jan. 2	52.72 Oct. 9	52.69 Jan. 2	47.75 Jan. 30	42.00 Oct. 23
1950	4.131¢ Dec. 1	3.837¢ Jan. 3	52.69 Dec. 12	45.88 Jan. 3	45.13 Dec. 19	26.25 Jan. 3
1949	3.837¢ Dec. 27	3.3705¢ May 3	46.87 Jan. 18	45.88 Sept. 6	43.00 Jan. 4	19.33 June 28
1948	3.721¢ July 27	3.193¢ Jan. 1	46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
1947	3.193¢ July 29	2.848¢ Jan. 1	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.848¢ Dec. 31	2.464¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.464¢ May 29	2.396¢ Jan. 1	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.396¢	2.396¢	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.396¢	2.396¢	23.61	23.61	$19.17	$19.17
1942	2.396¢	2.396¢	23.61	23.61	19.17	19.17
1941	2.396¢	2.396¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	18.92 May 22
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.27207¢ May 16	22.61 Sept.19	20.61 Sept.12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	32.25 Mar. 9	20.25 Feb. 16	21.92 Mar.30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug.11	17.75 Dec. 21	12.67 June 8
1929	2.31773¢ May 28	2.26498¢ Oct. 29	1871 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

why *stock steel in long lengths?*

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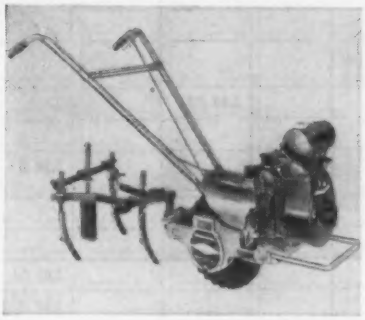

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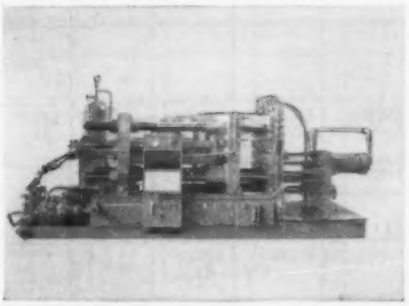
Phone our nearest office today and one of our Sure Spec sales engineers will gladly give you the facts that can help you save considerable money.



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STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		INGOTS		BILLETS, BLOOMS, SLABS			PIPE SKELP	PILING	SHAPES, STRUCTURAL		STRIP			
		Carbon Forging Net Ton	Alloy Net Ton	Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Steel Sheet	Carbon	Hi Str. Low Alloy	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy
EAST	Bethlehem, Pa.					$70.00 *B3*			3.70 *B3*	5.50 *B3*				
	Buffalo, N. Y.			$56.00 *B3*	$66.00 *B3, R3*	$70.00 *B3, R3*		4.45 *B3*	3.70 *B3*	5.50 *B3*	3.50 *B3, R3*	4.65 *B3*	4.95 *B3*	6.40 *B3*
	Claymont, Del.													
	Conshohocken, Pa.				$73.00 *A2*	$77.00 *A2*					3.90 *A2*		5.55 *A2*	
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.			$56.00 *B3*	$66.00 *B3*	$70.00 *B3*			3.70 *B3*	5.50 *B3*	3.50 *B3*			
	Newark, N. J.													
	New Haven, Conn.											5.15 *A5* 5.85 *D1*		
	Phoenixville, Pa.								5.90 *P2*					
	Putnam, Conn.													
	Sparrows Pt., Md.										3.50 *B3*	4.65 *B3*	4.95 *A5, B3*	6.40 *B3*
	Worcester, Mass.													
	Trenton, N. J.											6.00 *R4*		
MIDDLE WEST	Alton, Ill.										3.95 *L1*			
	Ashland, Ky.										3.50 *A7*			
	Canton-Massillon				$66.00 *R3,*	$70.00 *R3* $66.00 *T5*								
	Chicago, Ill.			$56.00 *U1*	$66.00 *U1, R3, W8*	$70.00 *U1, R3, W8*		4.45 *U1*	3.65 *U1, W8*	5.50 *U1*	3.50 *A1, W8*	4.90 *A1, I3*		
	Cleveland, Ohio				$66.00 *R3*							4.65 *A5, J3*		6.55 *A5* 6.70 *J3*
	Detroit, Mich.		$54.00 *R5*		$69.00 *R5*	$73.00 *R5*					4.40 *M2* 3.80 *G4*	4.85 *G4* 5.45 *M2* 5.60 *R5, D1*	5.95 *G4*	
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana			$56.00 *U1*	$66.00 *U1*	$70.00 *U1, Y1*		4.45 *I3*	3.65 *U1, I3*	5.50 *U1, I3* 6.00 *Y1*	3.50 *U1, Y1, I3*	4.90 *I3*	5.30 *U1, I3* 5.80 *Y1*	
	Granite City, Ill.													
	Kokomo, Ind.													
	Middletown, Ohio										3.50 *A7*	4.65 *A7*		
	Niles, Ohio Sharon, Pa.										4.00 *S1*	5.35 *S1*	5.40 *S1*	6.55 *S1*
	Pittsburgh, Pa.	$52.00 *U1*	$54.00 *U1, C11*	$56.00 *U1,*	$66.00 *U1,*	$70.00 *U1, C11*	3.35 *U1* 3.45 *J3*	4.45 *U1*	3.65 *U1, J3*	5.50 *U1, J3*	4.00 *S9, S7* 3.75 *A3* 3.50 *J3, A7*	4.65 *J3, A7* 5.00 *A3* 5.35 *B4, S7*		
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.								3.90 *W3*		3.60 *W3*	4.65 *W3* 5.35 *F3*	5.75 *W3*	7.20 *W3*
	Youngstown, Ohio					$70.00 *Y1* *C10*	3.35 *U1, R3*			6.00 *Y1*	3.50 *U1, R3, Y1*	4.65 *R2, Y1* 5.25 *C5, T4* 5.35 *B4*	5.30 *U1, R3* 5.80 *Y1*	6.55 *R3* 7.05 *Y1*
WEST	Fontana, Cal.	$79.00 *K1*	$80.00 *K1*	$75.00 *K1*	$85.00 *K1*	$89.00 *K1*			4.25 *K1*	6.10 *K1*	4.75 *K1*	6.30 *K1*	6.20 *K1*	6.95 *K1*
	Geneva, Utah				$66.00 *G1*				3.65 *G1*	5.50 *G1*				
	Kansas City, Mo.								4.25 *S2*		4.10 *S2*			
	Los Angeles, Calif.				$85.00 *B2*	$90.00 *B2*			4.25 *B2, C7*	6.05 *B2*	4.25 *B2, C7*	6.40 *C1*	6.05 *B2*	
	Minnequa, Colo.								4.10 *C6*		4.55 *C6*			
	San Francisco, Cal.				$85.00 *B2*				4.20 *B2*	6.00 *B2*	4.25 *C7, B2*		6.05 *B2*	
	Seattle, Wash.				$85.00 *B2*				4.30 *B2*	6.10 *B2*	4.50 *B2*		6.30 *B2*	
SOUTH	Atlanta, Ga.										4.05 *A8*			
	Birmingham, Ala.			$56.00 *T2*	$66.00 *T2*				$3.60 *R3* 3.65 *T2*	5.50 *T2*	3.50 *R3, T2*		5.30 *T2*	
	Houston, Texas		$62.00 *S2*		$74.00 *S2*	$78.00 *S2*			4.05 *S2*		3.90 *S2*			

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL PRICES

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE	
Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized 10 ga.	Enameling 12 ga.	Long Terne 10 ga.	Hi. Str. Low Alloy H.R.	Hi. Str. Low Alloy C.R.	Hi. Str. Low Alloy Galv.	Hot-rolled 19 ga		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.	
													Bethlehem, Pa.
3.60 *B3*	4.35 *B3*				5.40 *B3*	6.55 *B3*			4.10 *W6*				Buffalo, N. Y.
										†Special coated mfg ternes deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb, deduct $2.20 from 1.25-lb coke base box. * COKES: 1.50-lb, add 25¢. ELECTRO: 0.50-lb, add 25¢; 0.75-lb, add 65¢.			Clayment, Del.
													Conteaville, Pa.
4.00 *A2*					5.65 *A2*								Conshohocken, Pa.
													Harrisburg, Pa.
													Hartford, Conn.
									4.10 *B3*				Johnstown, Pa.
													Newark, N. J.
													New Haven, Conn.
													Phoenixville, Pa.
													Putnam, Conn.
3.60 *B3*	4.35 *B3*	4.80 *B3*			5.40 *B3*	6.55 *B3*	6.75 *B3*		4.20 *B3*	$8.55 *B3*	$7.25 *B3*		Sparrows Pt., Md.
									4.40 *A5*				Worcester, Mass.
									4.20 *R4*				Trenton, N. J.
									4.40 *L1*				Alton, Ill.
3.60 *A7*		4.80 *A7*	4.65 *A7*										Ashland, Ky
		4.80 *R3*											Canton-Massilon
3.60 *W8*					5.40 *U1*				4.10 *A5,R3, N4*				Chicago, Ill.
3.60 *R3,J3*	4.35 *R3,J3*		4.65 *R3*		5.40 *R3,J3*	6.55 *R3,J3*			4.10 *A5*		$7.15 *R3*		Cleveland, Ohio
3.80 *G4* 4.40 *M2*	4.55 *G4*				5.95 *G4*	7.10 *G4*							Detroit, Mich.
													Duluth, Minn.
3.60 *U1, Y1,I3*	4.35 *U1, Y1,I3*	4.80 *U1,I3*	4.65 *U1,I3*	5.20 *U1*	5.40 *U1,I3* 5.90 *Y1*	6.55 *U1,I3* 7.05 *Y1*		5.40 *I3*	4.10 *Y1*	$8.45 *B3, U1, Y1*	$7.15 *U1,I3*	5.85 *U1* 5.30 *Y1*	Gary, Ind. Harbor, Indiana
4.30 *G3*	5.05 *G3*	5.50 *G3*	5.35 *G3*								$7.35 *G3*	6.05 *G3*	Granite City, Ill.
		5.20 *C9*											Kokomo, Ind.
3.60 *A7*	4.35 *A7*	4.80 *A7*	4.65 *A7*	5.20 *A7*									Middletown, Ohio
5.25 *N3* 4.00 *S1*		6.00 *N3*		6.00 *N3*	5.40 *S1*								Niles, Ohio; Sharon, Pa.
3.60 *U1, J3,A7* 2.75 *A3*	4.35 *U1, J3,A7*	4.80 *U1*	4.65 *U1*		5.40 *U1,J3*	6.55 *U1,J3*	7.20 *U1*		4.10 *A5* 4.30 *P6*	$8.45 *U1,J3*	$7.15 *U1,J3*	5.85 *U1*	Pittsburgh, Pa.
									4.30 *P7*				Portsmouth, Ohio
3.60 *W3,W5*	5.35 *F3* 4.35 *W3,W5*	4.80 *W3,W5*		5.20 *W3,W5*	5.75 *W3*	6.90 *W3*				$8.45 *W3,W5*	$7.15 *W3,W5*	6.15 *W5* 5.85 *F3*	Weirton, Wheeling, Follansbee, W. Va.
3.60 *U1, R3, Y1*	4.35 *R3, Y1*	5.50 *R1*	4.65 *Y1*	6.05 *E2*	5.40 *U1,R3* 5.90 *Y1*	6.55 *R3* 7.05 *Y1*		6.05 *R1,E2*	4.10 *Y1*	$8.45 *R3*		5.30 *R3*	Youngstown, Ohio
4.55 *K1*	5.30 *K1*				6.35 *K1*	7.50 *K1*			4.90 *K1*				Fontana, Cal.
3.70 *G1*													Geneva, Utah
													Kansas City, Mo.
4.30 *C7*		5.55 *C7*						5.40 *C7*	4.90 *B2,C7*	$9.20 *C7*	$7.90 *C7*		Los Angeles, Cal.
									4.35 *C6*				Minnequa, Colo.
4.30 *C7*	5.30 *C7*	5.55 *C7*							4.90 *A5*				San Francisco, Cal.
													Seattle, Wash.
													Atlanta, Ga.
3.60 *R3,T2*	4.35 *T2*	4.80 *R3,T2*			5.40 *T2*			4.75 *R3*	4.10 *R3,T2*	$8.55 *T2*	$7.25 *T2*		Birmingham, Ala.
									4.50 *S2*				Houston, Texas

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mf'r's. Bright
EAST	Bethlehem, Pa.				4.30 *B3*	5.40 *B3*	5.55 *B3*					
	Buffalo, N. Y.	3.70 *B3,R3*	3.70 *B3,R3*	4.60 *B5*	4.30 *B3,R3*	5.40 *B3*	5.55 *B3*	3.70 *B3*				4.85 *W6*
	Claymont, Del.							4.15 *C4*		4.85 *C4*		
	Coatesville, Pa.							4.15 *L4*		5.25 *L4*		
	Conshohocken, Pa.							4.15 *A2*	4.75 *A2*	5.05 *A2*	5.90 *A2*	
	Harrisburg, Pa.							6.30 *C3*	6.30 *C3*			
	Hartford, Conn.			5.10 *R3*		5.85 *R3*						
	Johnstown, Pa.	3.70 *B3*	3.70 *B3*		4.30 *B3*		5.55 *B3*	3.70 *B3*		4.75 *B3*	5.65 *B3*	4.85 *B3*
	Newark, N. J.			5.00 *W10*		5.75 *W10*						
	New Haven, Conn.											
	Phoenixville, Pa.											
	Putnam, Conn.			5.10 *W10*								
	Sparrows Point, Md.		3.70 *B3*					3.70 *B3*		4.75 *B3*	5.65 *B3*	4.95 *B3*
	Worcester, Mass.			5.10 *B5*		5.75 *A5*						5.15 *A5,W6*
	Trenton, N. J.											
MIDDLE WEST	Alton, Ill.	4.15 *L1*										5.05 *L1*
	Ashland, Ky.							3.70 *A7*				
	Canton-Massillon	3.70 *R3*		4.55 *R3,R2*	3.95 *T5* 4.30 *R3*	4.90 *T5* 5.40 *R3,R2*						
	Chicago, Ill.	3.70 *U1,R3, W8*	3.70 *R3*	4.55 *A5,R5, W8 W1*	4.30 *U1,R3, W8*	5.40 *R3,W8, W10,B5,L2* 5.45 *A5*		3.70 *U1,W8*	4.75 *U1*	4.75 *U1*	5.65 *U1*	5.10 *W7* 4.85 *R3,A5, K2,N4*
	Cleveland, Ohio	3.70 *R3*	3.70 *R3*	4.55 *A5,C13*		5.45 *A5*	5.55 *R3,J3*	3.70 *R3,J3*	4.75 *J3*		5.65 *R3,J3*	4.85 *A5,C13*
	Detroit, Mich.	3.85 *R5*		4.70 *P8* 4.80 *P3*	4.45 *R5* 4.65 *G4*	5.55 *P8* 5.60 *P3*						
	Duluth, Minn.											4.85 *A5*
	Gary, Ind. Harbor, Indiana	3.70 *U1,R3, Y1,I3*	3.70 *U1,I3, Y1*	4.55 *R3,M5, L2*	4.30 *U1,I3, Y1*	5.40 *R3,M5, L2*	5.55 *U1,I3,* 6.05 *Y1*	3.70 *U1,I3, Y1*	4.75 *I3*	4.75 *U1*	5.65 *U1,I3* 6.15 *Y1*	5.10 *M4*
	Granite City, Ill.							4.40 *C3*				
	Kokomo, Ind.											4.95 *C9*
	Middletown, Ohio											
	Niles, Ohio Sharon, Pa.							3.95 *S1*		5.20 *S1*	5.70 *S1*	
	Pittsburgh, Pa.	3.70 *U1,J3*	3.70 *U1,J3*	4.55 *R3,A5, J3,S8,W10, C8*	4.30 *U1,C11*	5.40 *C11,S8, W10,C8,A5*	5.55 *U1,J3*	3.70 *U1,J3*	4.75 *U1*	4.75 *U1*	5.65 *U1,J3*	4.85 *A5,J3* 5.10 *P6*
	Portsmouth, Ohio											5.25 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	3.85 *W3*						4.00 *W3,W5*				
	Youngstown, Ohio	3.70 *U1,R3, Y1*	3.70 *U1,R3, Y1*	4.55 *Y1,F2*	4.30 *U1, Y1, C10*	5.40 *Y1,C10, F2*	5.55 *U1* 6.05 *Y1*	3.70 *U1,R3, Y1*			5.65 *R3* 6.15 *Y1*	4.85 *Y1*
WEST	Fontana, Cal.	4.40 *K1*	4.40 *K1*		5.35 *K1*		6.60 *K1*	4.30 *K1*		5.70 *K1*	6.25 *K1*	
	Geneva, Utah							3.70 *G1*			5.65 *G1*	
	Kansas City, Mo.	4.30 *S2*	4.30 *S2*		4.90 *S2*							5.45 *S2*
	Los Angeles, Cal.	4.40 *C7,B2*	4.40 *C7,B2*	6.00 *B2,R3*	5.35 *B2*		6.25 *B2*					5.80 *C7*
	Minnequa, Colo.	4.15 *C6*	4.50 *C6*					4.50 *C6*				5.10 *C6*
	San Francisco, Cal.	4.45 *B2* 4.40 *C7*	4.45 *B2,C7*				6.30 *B2*					5.80 *C7*
	Seattle, Wash.	4.45 *B2*	4.45 *B2*				6.30 *B2*	4.60 *B2*			6.55 *B2*	
SOUTH	Atlanta, Ga.	4.25 *A8*	4.25 *A8*									5.10 *A8*
	Birmingham, Ala.	3.70 *R3,T2*	3.70 *R3,T2*				5.55 *T2*	3.70 *R3,T2*			5.65 *T2*	4.85 *R3,T2*
	Houston, Tex.	4.10 *S2*	4.10 *S2*		4.70 *S2*			4.10 *S2*				5.25 *S2*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.

C1 California Cold Rolled Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Steel Corp., Claymont, Del.
C5 Cold Metal Products Co., Youngstown
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia-Geneva Steel Co., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Glassport, Pa.
C11 Crucible Steel Co. of America, New York
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Geneva Steel Co., Salt Lake City
G2 Globe Iron Co., Jackson, O.
G3 Granite City Steel Co., Granite City Ill.
G4 Great Lakes Steel Corp., Detroit

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago

K1 Kaiser Corp., Oakland, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.

L1 Lackede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Co., Inc., Hammond, Inc.
M6 Mystic Iron Works, Everett, Mass.

N1 National Supply Co., Pittsburgh
N2 National Tube Co., Pittsburgh
N3 Niles Rolling Mills Co., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.

O1 Oliver Iron & Steel Co., Pittsburgh

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div. Eaton Mfg. Co., Massillon, O
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co. (John A.), Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sloss Sheffield Steel & Iron Co., Birmingham
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Swett's Steel Co., Williamsport, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal, Iron & R. R. Co., Birmingham
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Steel Co., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.

U1 United States Steel Co., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Co., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh

Y1 Youngstown Sheet & Tube Co., Youngstown

Steel Prices

Base price, f.o.b., dollars per 100 lb. *(Metropolitan area delivery add 20¢ except B'ham, San Fran., Cincinnati, New Orleans, St. Paul, add 15¢; Memphis, add 10¢; Phila., add 25¢; N. Y., add 30¢.)

WAREHOUSES — Cities	Sheets: Hot-Rolled	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates: Standard Structural	Shapes: Standard Structural	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: Hot-Rolled A 4615 As rolled	Alloy Bars: Hot-Rolled A 4140 Annealed	Alloy Bars: Cold-Drawn A 4615 As rolled	Alloy Bars: Cold-Drawn A 4140 Annealed
Baltimore	5.60	6.84	7.49[2] 8.07	6.04	.....	5.80	6.14	6.04	6.84– 6.89	10.24	10.54	11.89	12.19
Birmingham*	5.60	6.40	6.75	5.55	.....	5.95	5.70	5.55	.....	.....	.....	.....	.....
Boston	6.20	7.00– 7.25	7.74– 8.29	6.15	8.50[4]	6.48– 6.78	6.20	6.05	6.79– 6.84	10.25	10.55	11.90– 12.00	12.20– 12.30
Buffalo	5.60	6.40	7.74– 8.09	5.86	.....	6.05	5.80	5.60	6.40– 6.45	10.15– 10.85	10.45	11.80	11.95– 12.10
Chicago	5.60	6.40	7.75	5.55	.....	5.80	5.70	5.55	6.30	9.80	10.10	11.45	11.75
Cincinnati*	5.87	6.44	7.39	5.80	.....	6.19	6.09	5.80	6.61	10.15	10.45	11.80	12.10
Cleveland	5.60	6.40	8.10	5.69	6.90	5.92	5.82	5.57	6.40	9.91	10.21	11.56	11.86
Detroit	5.78	6.53	7.89	5.94	.....	5.99	6.09	5.84	6.56	10.11	10.41	11.76	12.06
Houston	7.00	8.25	.....	.....	.....	6.85	6.50	6.65	9.35	10.35	11.25	.....	12.75
Indianapolis, del'd	6.00	6.80	8.15	5.95	.....	6.20	6.10	5.95	6.80	.....	.....	.....	.....
Kansas City	6.00	6.80	7.45	6.15	7.50	6.40	6.30	6.15	7.00	10.40	10.70	12.05	12.35
Los Angeles	6.35	7.90	8.85	6.40	9.45[6]	6.40	6.35	6.35	8.20	11.30	11.30	13.20	13.50
Memphis*	6.33– 6.38	7.08– 7.18	.....	6.33– 6.38	.....	6.43– 8.02	6.33– 6.48	6.08– 6.33	7.16– 7.32	.....	.....	.....	.....
Milwaukee	5.74	6.54	7.89	5.69– 6.59	.....	5.94	5.84	5.69	6.44– 6.54	9.94	10.24	11.59	11.89
New Orleans*	5.70	6.39	.....	5.75	7.25	5.95	5.75	5.75	7.30	.....	.....	.....	.....
New York*	5.67– 5.97	7.19[5]– 7.24[1]	8.14[2]	6.29– 6.89	8.63[4]	6.28– 6.58	6.10	6.12	6.99	10.05– 10.15	10.35– 10.45	11.70– 11.80	12.10– 12.20
Norfolk	6.50[3]	.....	.....	.....	.....	6.50[3]	6.60[3]	6.55[3]	.....	.....	.....	.....	.....
Philadelphia*	5.90	6.80	8.00	6.10	.....	6.05	5.90	6.05	6.86	..90	10.20	.....	.....
Pittsburgh	5.60	6.40	7.75	5.65– 5.95	.....	5.75	5.70	5.55	6.15	9.80	10.10	11.45	11.75
Portland	6.60– 7.55	8.95	8.50– 9.10	7.30	.....	6.80	6.95	6.90	.....	.....	12.15	.....	.....
Salt Lake City	7.05	.....	9.70– 10.50[2]	8.70– 8.75	.....	8.05	6.75– 8.30	7.95– 8.65	9.00	.....	.....	.....	.....
San Francisco*	6.65– 6.79	7.70– 7.88[2]	8.55– 9.25[2]	6.44– 6.60	9.95[6]	6.40– 6.49	6.45– 6.64	6.40– 6.45	8.20– 8.21	11.30	11.20– 11.30	13.20	13.50
Seattle	7.05	8.60	9.20	9.05	.....	6.75	6.65	6.75	9.05	.....	.....	.....	.....
St. Louis	5.80– 5.85	6.65	8.00	5.80	8.00[4]– 8.28	6.13	6.03	5.80	6.55– 6.65	10.05	10.35	11.70	12.00
St. Paul*	6.16	6.96	8.31	6.11	.....	6.36	6.26	6.11	6.96	10.36	10.66	12.01	12.31

BASE QUANTITIES (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanizing sheets, for quantity.
EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 400 to 1999 lb; (4) 6000 lb and over; (5) 1500 to 9999 lb; (6) 2000 to 5999 lb.

STAINLESS STEELS

Base price, cents per lb. f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots rerolling	14.25	15.25	16.75	16.25	24.75	20.00	21.75	12.75	14.75	13.00
Slabs billets rerolling	18.50	20.00	22.00	21.00	32.25	26.25	28.50	16.50	20.00	16.75
Forg. discs die blocks rings	34.00	34.25	36.75	35.75	53.00	40.25	44.75	28.00	28.50	28.50
Billets forging	26.25	26.50	28.50	27.75	41.50	31.25	35.00	21.50	22.00	22.00
Bars wires structurals	31.25	31.50	34.00	33.00	49.25	37.00	41.50	25.75	26.25	26.25
Plates	33.00	33.25	35.25	35.25	52.00	40.75	45.25	27.00	27.50	27.50
Sheets	41.00	41.25	43.25	43.25	57.00	49.25	53.75	36.50	37.00	39.00
Strip hot-rolled	26.50	28.25	32.50	30.25	48.75	37.00	41.25	23.50	30.25	24.00
Strip cold-rolled	34.00	36.75	40.25	38.75	59.00	48.25	52.25	30.50	37.00	31.00

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2;* (type 316 add 4.5¢) *J3;* Baltimore, *E1;* Middleton, O., *A7;* Massilon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4;* Lockport, N. Y., *R4.*
Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa. *W2;* (type 316 add 4.5¢); W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massilon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C5;* Lockport, N. Y., *S4;* New Britain, Conn., *S7;* Sharon, Pa., *S1* (type 301 add ¼¢); Butler, Pa., *A7;* Wallingford, Conn., *W1.*
Bars: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massilon, O., *R3;* Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Lockport, N. Y., *S4;* Canton, O., *T5;* Ft. Wayne, *J4.*
Wire: Waukegan, *A5;* Massilon, O., *R3;* McKeesport, Pa., *F1;* F. Wayne, *J4;* Trenton, N. J., *R4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*
Structurals: Baltimore, *A7;* Massilon, O., *R3;* Chicago, *I1, J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*
Plates: Brackenridge, Pa., *A3* (type 416 add ½¢); Butler, Pa., *A7;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Lockport, N. Y., *S4;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massilon, *R3.*
Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*
Forging billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massilon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11.*
ALLEGHENY LUDLUM—Slightly higher on Type 301; slightly lower on others in 300 series.
WASHINGTON STEEL—Slightly lower on 300 series except where noted.

PIPE AND TUBING

Base discounts, f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS					
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½-3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																				
Sparrows Pt. *B3*	34.0	12.0	37.0	16.0	39.0	19.5	40.0	20.0	40.5	21.0	41.0	21.5	41.5	22.0	....	....	....	....	....	....
Cleveland *R3*	36.0	14.0	39.0	18.0	41.5	21.5	42.9	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Oakland *K1*	25.0	3.0	28.0	7.0	30.5	10.5	31.0	11.0	31.5	12.0	32.0	12.5	32.5	13.0	....	....	....	....	....	....
Pittsburgh *J3*	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.5	8.0	32.5	11.5	34.5	13.5
Pittsburgh *N2*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
Alton, Ill. *L1*	35.0	13.0	38.0	17.0	40.5	20.5	41.0	21.0	41.5	22.0	42.0	22.5	42.5	23.0	....	....	....	....	....	....
Sharon *M3*	36.0	13.0	39.0	17.0	41.5	21.0	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.0	....	....	....	....	....	....
Pittsburgh *N1*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	....	32.5	....	34.5	....
Wheeling *W5*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Wheatland *W4*	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown *Y1*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
EXTRA STRONG, PLAIN ENDS																				
Sparrows Pt. *B3*	33.5	13.0	37.5	17.0	39.5	20.5	40.0	21.0	40.5	22.0	41.0	22.5	41.5	23.0	....	....	....	....	....	....
Cleveland *R3*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Oakland *K1*	24.5	4.0	28.5	8.0	30.5	11.5	31.0	12.0	31.5	13.0	32.0	13.5	32.5	14.0	....	....	....	....	....	....
Pittsburgh *J3*	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.0	7.5	33.0	12.0	36.5	15.5
Pittsburgh *N2*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	10.0	33.0	14.0	36.5	17.5
Alton, Ill. *L1*	32.5	12.0	36.5	16.0	38.5	19.5	39.0	20.0	39.5	21.0	40.0	21.5	40.5	22.0	....	....	....	....	....	....
Sharon *M3*	35.5	14.0	39.5	18.0	41.5	21.0	42.0	21.5	42.5	22.0	43.0	22.5	43.5	23.0	....	....	....	....	....	....
Pittsburgh *N1*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	....	33.0	....	36.5	....
Wheeling *W5*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Wheatland *W4*	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown *Y1*	35.5	15.0	39.5	19.0	41.0	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	26.0	29.0	10.0	33.0	14.0	36.5	17.5

Galvanized discounts based on zinc, at 17¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ½ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in., 3 in., ¼ pt. Calculate discounts on even cents per lb of zinc, i.e., if zinc is 16.51¢ to 17. 50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢.
x Threads only, buttweld and seamless, 1 pt. higher discount. Plain ends, buttweld and seamless, 3 in. and under, 3½ pts. higher discount. Buttweld jobbers' discount, 5 pct. East St. Louis zinc price now 19.50¢.

COKE

	Net-Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$14.50 to $16.00
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$17.50 to $18.00
Foundry, oven coke	
Buffalo, del'd	$26.69
Chicago, f.o.b.	23.00
Detroit, f.o.b.	24.00
New England, del'd	24.80
Seaboard, N. J., f.o.b.	22.75
Philadelphia, f.o.b.	22.70
Swedeland, Pa., f.o.b.	22.60
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	22.50
Cleveland, del'd	25.72
Cincinnati, del'd	25.06
St. Paul, f.o.b.	22.50
St. Louis	25.40
Birmingham, del'd	21.69
Neville Island	23.00

ELECTRICAL SHEETS

22 Ga. H-R cut length F.o.b. Mill Cents Per Lb.	Armature	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beech Bottom *W5*	....	7.25	8.50	9.30	9.85	10.40	11.10
Brackenridge *A3*	....	7.25	8.50	9.30	9.85	....	....
Follansbee *F3*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Granite City *G3*	....	7.95	9.20	....	....	....	....
Ind. Harbor *B3*	6.75	7.25	....	....	....	....	....
Mansfield *E2*	7.25	7.75	9.00	9.80	....	....	....
Niles, O. *N3*	7.05	7.55	....	....	....	....	....
Vandergrift *U1*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Warren, O. *R3*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Zanesville *A7*	6.75	7.25	8.50	9.30	9.85	10.40	11.10

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Foundry	Malleable	Bessemer	Low Phos.	Bl. Furnace Silvery	Low Phos. Charcoal
Bethlehem *B3*	54.00	54.50	55.00	55.50	....	....	....
Birmingham *R3*	48.38	48.88	....	....	....	....	....
Birmingham *W9*	48.38	48.88	....	....	....	....	....
Birmingham *S5*	48.38	48.88	....	....	....	....	....
Buffalo *R3*	52.00	52.50	53.00	....	....	....	....
Buffalo *H1*	52.00	52.50	53.00	....	....	63.75	....
Chicago *I4*	52.00	52.50	52.50	53.00	....	....	....
Cleveland *A5*	52.00	52.50	52.50	53.00	57.00	....	....
Cleveland *R3*	52.00	52.50	52.50	....	....	....	....
Daingerfield, Tex. *L3*	48.00	48.50	48.50	....	....	....	....
Duluth *I4*	52.00	52.50	52.50	53.00	....	....	....
Erie *I4*	52.00	52.50	52.50	53.00	....	....	....
Everett, Mass. *M6*	....	59.75	60.25	....	....	....	....
Fontana *K1*	58.00	58.50	....	....	....	....	....
Geneva, Utah *U1, Y1*	52.00	52.50	52.50	53.00	....	....	....
Granite City, Ill. *K3*	53.90	54.40	54.90	....	....	....	....
Hubbard, Ohio *Y1*	52.00	52.50	52.50	....	....	....	....
Ironton, Utah *C7*	52.00	52.50	....	....	....	....	....
Jackson, Ohio *J1,G2*	....	....	....	....	....	62.50	....
Lyle, Tenn. *T3*	....	....	....	....	....	....	66.00
Monessen *P6*	54.00	....	....	....	....	....	....
Neville Island *P4*	52.00	52.50	52.50	53.00	....	....	....
Pittsburgh *U1*	52.00	....	....	53.00	....	....	....
Sharpsville *S3*	52.00	52.50	52.50	53.00	....	....	....
Steelton *B3*	54.00	54.50	55.00	55.50	60.00	....	....
Swedeland *A2*	56.00	56.50	57.00	57.50	....	....	....
Toledo *I4*	52.00	52.50	52.50	53.00	....	....	....
Troy, N. Y. *R3*	54.00	54.50	55.00	....	60.00	....	....
Youngstown *Y1*	52.00	52.50	52.50	53.00	....	....	....
N. Tonawanda, N. Y. *T1*	....	52.50	53.00	....	....	....	....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base, (1.75 to 2.25 pct, except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 pct and over. Silvery Iron: Add $1.50 per net ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. $1 per ton for 0.75 pct or more phosphorus, manganese as above. Bessemer ferrosil on prices are $1 over comparable silvery iron.

BOILER TUBES

Per 100 ft. cut, 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	22.67	26.66	21.99	25.88
	2½	12	29.48	35.84	29.57	34.76
	3	12	33.90	39.90	32.89	38.70
	3½	11	42.37	49.80	41.10	48.30
	4	10	52.60	61.88	51.03	60.02
National Tube	2	13	21.62	26.48	....	....
	2½	12	29.65	36.32	....	....
	3	12	34.00	41.64	....	....
	3½	11	40.34	49.41	....	....
	4	10	51.21	62.72	....	....
Pittsburgh Steel	2	13	....	27.88	....	....
	2½	12	30.49	37.15	....	....
	3	12	34.95	42.59	....	....
	3½	11	41.48	50.54	....	....
	4	10	52.65	64.16	....	....

CAST IRON WATER PIPE

	Per Net Ton
6 to 24-in., del'd Chicago	$105.30 to $108.80
6 to 24-in., del'd N.Y.	108.50 to 109.50
6 to 24-in., Birmingham	91.50 to 96.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipment less	$123.00 to $130.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

C-R SPRING STEEL

Cents Per Lb. F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Bridgeport, Conn. *S7*	5.35	6.80	7.40	9.35	11.65
Carnegie, Pa. *S9*	....	6.80	7.40	9.35	11.65
Cleveland *A5*	4.65	6.45	7.40	9.35	11.65
Detroit *D1*	5.60	6.65	7.25	....	....
New Castle, Pa. *B4*	5.35	6.80	7.40	9.3	....
New Haven, Conn. *D1*	5.85	6.75	7.35	....	....
Sharon, Pa. *S1*	5.35	6.80	7.40	9.35	11.65
Weirton, W. Va. *W3*	5.35	6.80	7.40	9.35	11.65
Worcester, Mass. *A5*	4.95	6.75	7.70	9.65	11.65
Youngstown *C5*	....	6.80	7.40	9.35	11.65

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Base Col.	Woven Wire Fence 9-15½ ga. Base Col.	Fence Posts Base Col.	Single Loop Bale Ties Base Col.	Twisted Barbless Wire Base Col.	Gal. Barbed Wire Base Col.	Merch. Wire Ann'ld ¢/lb.	Merch. Wire* Gal. ¢/lb.
Alabama City *R3*	118	126	....	123	....	136	5.70	5.95
Aliquippa, Pa. *J3*	118	132	....	....	136	140	5.70	6.15
Atlanta *A8*	121	133	....	126	126	143	5.95	6.40
Bartonville *K2*	118	130	....	123	143	143	5.70	6.15
Buffalo *W6*	....	....	....	....	....	....	4.85	....
Cleveland *A6*	125	....	....	....	....	....	....	....
Cleveland *A5*	....	....	....	....	....	....	5.70	6.15
Crawfordsvl. *M4*	....	132	....	....	....	145	5.95	6.40
Donora, Pa. *A5*	118	130	....	123	140	140	5.70	6.15
Duluth *A5*	118	130	....	123	140	140	5.70	6.15
Fairfield, Ala. *T2*	118	130	....	123	....	140	5.70	6.15
Houston *S2*	126	138	....	....	....	148	6.10	6.55
Johnstn., Pa. *B3*	118	130	....	....	140	....	5.70	6.15
Joliet, Ill. *A5*	118	130	....	123	....	142	6.70	6.15
Kokomo, Ind. *C9*	120	132	....	125	138	142	5.80	6.05
Los Angeles *B2*	....	....	....	....	....	....	6.65	....
Kansas City *S2*	130	....	....	135	....	152	6.30	6.75
Minnequa *C6*	123	138	130	128	146	146	5.95	6.45
Monessen *P6*	124	135	....	....	....	145	5.95	6.40
Moline, Ill. *R3*	....	....	136	....	....	....	....	....
Pittsburg, Cal. *C7*	137	....	....	147	158	160	6.65	6.80
Portsmouth *P7*	124	137	....	....	....	147	6.10	6.60
Rankin, Pa. *A5*	118	130	....	....	....	140	5.70	6.15
So. Chicago *R3*	118	126	140	123	....	136	5.70	5.95
S. San Fran. *C6*	....	....	....	147	....	160	6.65	7.10
Sparrows Pt. *B3*	120	....	....	125	142	142	5.80	6.25
Sterling, Ill. *N4*	118	130	....	123	140	140	5.70	6.15
Struthers, O. *Y1*	....	....	....	....	....	....	6.70	6.15
Torrance, Cal. *C7*	138	....	....	....	....	....	6.65	....
Worcester *A5*	124	....	....	....	....	....	6.00	6.45
Williamsport, Pa. *S10*	....	....	150	....	....	....	....	....

Cut Nails, carloads, base $7.35 per 100 lb. (less 20¢ to jobbers), at Conshohocken, Pa., (*A2*), Wheeling, W. Va., (*W5*), $7.15.

* Alabama City and So. Chicago don't include zinc extra

—Miscellaneous Prices—

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Axles	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	3.60	4.00	4.70	....	....	....	....	....
Chicago *R3*	....	....	....	6.15	....	....	....	....
Cleveland *R3*	....	....	....	....	....	9.35	....	....
Ensley *T2*	3.60	4.00	....	....	....	....	....	....
Fairfield *T2*	....	4.00	4.70	6.15	5.60	....	4.50	9.80
Gary *U1*	3.60	4.00	....	....	....	....	4.50	....
Ind. Harbor *I3*	3.60	....	4.70	6.15	5.60	....	4.50	....
Johnstown *B3*	....	4.00	....	....	5.60	....	....	....
Joliet *U1*	....	4.00	4.70	....	....	....	....	....
Kansas City *S2*	....	....	....	6.40	....	....	....	9.85
Lackawanna *B3*	3.60	4.00	4.70	....	....	....	4.50	....
Lebanon *B3*	....	....	....	6.15	....	9.35	....	9.85
Minnequa *C6*	3.60	4.50	4.70	6.15	....	....	4.50	9.85
Pittsburgh *R3*	....	....	....	....	....	9.35	....	....
Pittsburgh *O1*	....	....	....	....	....	9.35	....	9.85
Pittsburgh *P5*	....	....	....	....	....	....	....	9.85
Pittsburgh *J3*	....	....	....	6.15	....	....	....	....
Pitt'g, Cal. *C7*	....	....	....	....	....	....	4.65	....
Seattle *B2*	....	....	....	6.65	....	....	4.65	....
Steelton *B3*	3.60	....	4.70	....	....	....	4.50	....
Struthers *Y1*	....	....	....	6.15	....	....	....	....
Torrance *C7*	....	....	....	....	....	....	4.65	....
Youngstown *R3*	....	....	....	6.15	....	....	....	....

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.505
18	4	1	—	5	$2.13
18	4	2	—	—	$1.65
1.5	4	1.5	8	—	81.0¢
6	4	2	6	—	96.5¢

High-carbon chromium ..... 63.5¢
Oil hardened manganese ..... 35¢
Special carbon ..... 32.5¢
Extra carbon ..... 27¢
Regular carbon ..... 23¢

Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.

CLAD STEEL

Base prices, cents per pound, f.o.b., mill

Stainless-carbon	Plate	Sheet
No. 304, 20 pct.		
Coatesville, Pa. *L4*	*29.5	
Washington, Pa. *J2*	*29.5	
Claymont, Del. *C4*	*28.00	
Conshohocken, Pa. *A2*		*27.50
New Castle, Ind. *I2*	*26.50	*25.50
Nickel-carbon		
10 pct Coatesville, Pa. *L4*	32.5	
Inconel-carbon		
10 pct Coatesville, Pa. *L4*	40.5	
Monel-carbon		
10 pct Coatesville, Pa. *L4*	33.5	
No. 302 Stainless-copper stainless, Carnegie, Pa. *A4*		77.00
Aluminized steel sheets, hot dip, Butler, Pa. *A7*		7.75

*Includes annealing and pickling, or sandblasting.

ELECTRODES

Cents per lb, f.o.b., plant threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
	GRAPHITE	
17, 18, 20	60, 72	17.85
8 to 16	48, 60, 72	17.85
7	48, 60	19.57
6	48, 60	20.95
4, 5	40	21.50
3	40	22.61
2½	24, 30	23.15
2	24, 30	25.36
	CARBON	
40	100, 110	8.03
35	65, 110	8.03
30	65, 84, 110	8.03
24	72 to 104	8.03
20	84, 90	8.03
17	60, 72	8.03
14	60, 72	8.57
10, 12	60	8.84
8	60	9.10

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton; Effective CaF_2 content:
70% or more $43.00
60% or less 40.00

Have you ever tried to remove rust-preventive oils and greases? It's a messy, time-consuming job . . . it's one your customers don't like . . . and it's really unnecessary! Now . . . thanks to Nox-Rust Vapor-Wrapper your customers can receive machines, parts and equipment "factory-fresh" . . . ready to use. There's no disassembling . . . no de-greasing needed. What's more, *you* save time, work and money by eliminating old-fashioned rust-preventives. When parts are packaged in sheets or bags of Vapor-Wrapper, they're safe from rust and corrosion for years. Find out the facts about this improved, modern method of rust-prevention. Just attach the coupon below to your letterhead for full details without obligation.

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CAUTION . . . Only Nox-Rust makes the exclusive new Vapor-Wrapper that's impregnated with Callex . . . the patented VOLATILE CORROSION INHIBITOR. (U. S. Patents 2,521,311—2,534,201—other patents pending).

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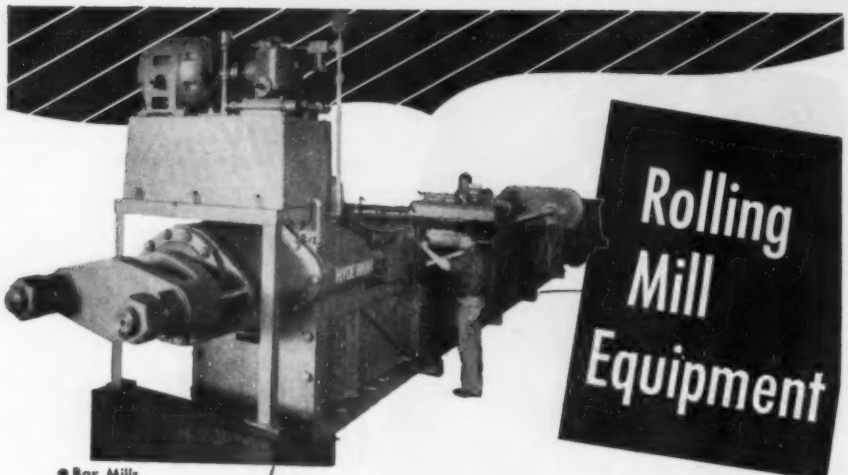
NOX-RUST Chemical Corporation
2443 South Halsted • Chicago 8, Illinois

Please send me full information on how my firm can benefit through use of Vapor-Wrapper.

Your Name_____

Address_____
(If different from letterhead)

City_____ State_____



Rolling Mill Equipment

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Outstanding in quality and in performance Hyde Park Rolling Mill Equipment has enjoyed the respect of the industry for more than fifty years.

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Works: Ambridge, Pa. • Chicago, Ill. • Newark, N. J. • Putnam, Conn.

Miscellaneous Prices

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices
(Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Nuts, Hot Pressed, Cold Punched—Sq.
Pct Off List

	Less Keg Reg.	K.	Less Keg Hvy.	K.
½ in. & smaller.	15	28½	15	28½
9/16 in. & ⅝ in.	12	25	6½	21
¾ in. to 1½ in. inclusive	9	23	1	16½
1⅝ in. & larger.	7½	22	1	16½

Nuts, Hot Pressed—Hexagon

½ in. & smaller.	26	37	32	34
9/16 in. & ⅝ in.	16½	29½	6½	21
¾ in. to 1½ in. inclusive	12	25	2	17½
1⅝ in. & larger.	8½	23	2	17½

Nuts, Cold Punched—Hexagon

½ in. & smaller.	26	37	22	34
9/16 in. & ⅝ in.	23	35	17½	30½
¾ in. to 1½ in. inclusive	19½	31½	12	26
1⅝ in. & larger.	12	25	6½	21

Nuts, Semi-Finished—Hexagon

	Reg.		Hvy.	
½ in. & smaller.	35	45	28½	39½
9/16 in. & ⅝ in.	29½	40½	22	34
¾ in. to 1½ in. inclusive	24	36	15	28½
1⅝ in. & larger.	13	26	8½	23
	Light			
7/16 in. & smaller	35	45		
½ in. thru ⅝ in.	28½	39½		
¾ in. to 1½ in. inclusive	26	37		

Stove Bolts *Pct Off List*

Packaged, steel, plain finished.	48—10
Packaged, plate finish	31—10
Bulk, plain finish**	63*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets *Base per 100 lb*

½ in. & larger	$7.35

Cap and Set Screws

(In bulk)	*Pct Off List*
Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright	54
¾ in. thru 1 in. up to & including 6 in.	48
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat	46
¾ in. thru 1 in. up to & including 6 in.	41
Milled studs	35
Flat head cap screws, listed sizes....	16
Fillister head cap, listed sizes	34
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	53

Machine and Carriage Bolts

	Pct Off List Less Case	C.
½ in. & smaller x 6 in. & shorter	15	28½
9/16 in. & ⅝ in. x 6 in. & shorter	18½	30½
¾ in. & larger x 6 in. & shorter	17½	29½
All diam. longer than 6 in...	14	27½
Lag, all diam. x 6 in. & shorter	23	35
Lag, all diam. longer than 6 in.	21	33
Plow bolts	34	...

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If you have missed the special Iron Age series of five articles on boron steel which appeared last July and August you may want to order a reprint.

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—Miscellaneous Prices—

REFRACTORIES

Fire Clay Brick

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5)	$94.60
No. 1 Ohio	88.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	88.00
No. 2 Ohio	79.20
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	13.75

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$94.60
Childs, Pa.	99.00
Hays, Pa.	100.10
Chicago District	104.50
Western Utah and Calif.	111.10
Super Duty, Hays, Pa., Athens, Tex., Chicago	111.10
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	16.50
Silica cement, net ton, bulk, Hays, Pa.	18.70
Silica cement, net ton, bulk, Ensley, Ala.	17.60
Silica cement, net ton, bulk, Chicago District	17.60
Silica cement, net ton, bulk, Utah, and Calif.	24.70

Chrome Brick *Per Net Ton*

Standard chemically bonded Balt., Chester	$82.00

Magnesite Brick

Standard, Baltimore	$104.00
Chemically bonded, Baltimore	93.00

Grain Magnesite *St. ¾-in. grains*

Domestic, f.o.b. Baltimore in bulk fines removed	$62.70
Domestic, f.o.b. Chewelah, Wash., in bulk	36.30
in sacks	41.80

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢	$13.75

LAKE SUPERIOR ORES

(51.50% *Fe; natural content, delivered lower lake ports*)	*Per gross ton*
Old range, bessemer	$8.70
Old range, nonbessemer	8.55
Mesabi, bessemer	8.45
Mesabi, nonbessemer	8.30
High phosphorus	8.30

After adjustments for analyses, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.4¢ to 9.0¢
Canadian sponge iron, del'd, In East	10.00¢
Domestic sponge iron, 98+% Fe, carload lots	15.5¢ to 17.0¢
Electrolytic iron, annealed, 99.5+% Fe	42.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	53.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe.	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe.	83.0¢ to $1.48
Aluminum	31.5¢
Brass, 10 ton lots	30.00¢ to 33.25¢
Copper, electrolytic	10.75¢ plus metal value
Copper, reduced	10.00¢ plus metal value
Cadmium, 100-199 lb.	95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity, del'd	$3.50
Lead	7.5¢ to 12.0¢ plus metal value
Manganese	57.0¢
Molybdenum, 99%	$2.75
Nickel, unannealed	88.0¢
Nickel, annealed	95.0¢
Nickel, spherical, unannealed	92.0¢
Silicon	38.5¢
Solder powder	7.0¢ to 9.0¢ plus met. value
Stainless steel, 302	83.00¢
Stainless steel, 316	$1.10
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$6.00
Zinc, 10 ton lots	28.0¢ to 30.5¢

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Convenient, central location and nearly 60 years of specialized experience make SIMONDS your *logical source* for large industrial gears. SIMONDS GEAR is able to assure you fast, accurate service on all types and sizes—Spur Gears up to 145", Bevel Gears up to 60", Worm Gears up to 72" . . . also worms, racks and pinions. Materials include cast or forged steel, gray iron, bronze, Meehanite, rawhide and bakelite. Whether your next heavy gear need is "rush" or "regular" . . . call SIMONDS first.

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SIMONDS GEARS

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LIBERTY at 25TH PITTSBURGH 22, PA.

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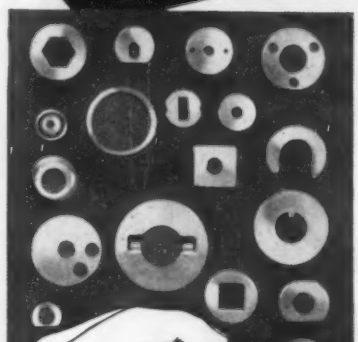
STEEL WASHERS FOR EVERY NEED



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Your requirements for standard and special steel washers are sure to be satisfied at Joliet. A bank containing thousands of special dies in many shapes and forms, 9/32" to 8" O.D., gauges No. 28 to 3/8", stands ready to answer your needs. A VARIETY OF FINISHES IS AVAILABLE to meet your special needs, including: Electro-plating, Galvanizing, Parkerizing, and Cyanide hardening.

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—Ferroalloy Prices—

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads delivered. (65-72% Cr, 2% max. Si.)

0.06% C	30.50	0.20% C	29.50
0.10% C	30.00	0.50% C	29.25
0.15% C	29.75	1.00% C	29.00
2.00% C			28.75
65-69% Cr, 4-9% C			22.00
62-66% Cr, 4-6% C, 6-9% Si.			22.50

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C.	$1.14
0.50% max. C.	1.10
9 to 11% C.	1.08

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down bulk 2-in. x down, 21.75¢ per lb of contained Cr plus 12.40¢ per lb of contained Si.

Bulk 1-in. x down, 21.90¢ per lb contained Cr plus 12.60¢ per lb contained Si

Calcium-Silicon

Contract price per lb of alloy, dump delivered.

30-33% Ca, 60-65% Si, 3.00% max. Fe.

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.30
Less ton lots	23.30

CMSZ

Contract price, cents per lb of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50.56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	20.75
Less ton lots	22.00

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.50
Less ton lots	19.50

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	16.50
Less ton lots	17.75

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.00
Ton lots to carload packed	19.00
Less ton lots	20.50

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size.

F.o.b. Niagara Falls, Alloy, W. Va., Ashtabula, O.	$185
F.o.b. Johnstown, Pa.	$187
F.o.b. Sheridan, Pa.	$185
F.o.b. Etna, Clairton, Pa.	$188

$2.00 for each 1% above 82% Mn, penalty, $3.15 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.95
Ton lots	12.55

Ferroalloy Prices

Continued

Spiegeleisen

Contract prices gross ton; lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$74.00	$75.00
Pgh. or Chicago	75.00	76.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	34.75
Ton lots	36.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.7% max. C, 0.06% P, 90% Mn	26.25	28.10	29.30
0.07% max. C	25.75	27.60	28.80
0.15% max. C	25.25	27.10	28.30
0.30% max. C	24.75	26.60	27.80
0.50% max. C	24.25	26.10	27.30
0.75% max. C, 7.00% max. Si	21.25	23.10	24.30

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

Carloads	9.90
Ton lots	11.30

Calcium molybdate, 46.3-46.6% f.o.b. Langeloth, Pa., per pound contained Mo. $1.15

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn 19.15¢

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.

Carload bulk	9.90
Ton lots	11.55
Briquet, contract basis carlots, bulk delivered, per lb of briquet	11.15
Ton lots	12.75

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $92.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $90.00. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	21.70
97% Si, 1% Fe	22.10

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	6.95
Ton lots	8.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump, bulk, carloads, delivered

25% Si	20.00	75% Si	14.30
50% Si	12.40	85% Si	15.55
90.95% Si			17.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrocolumbium, 50-60%, 2 in. x D, contract basis, delivered, per pound contained Cb.

Ton lots	$4.90
Less ton lots	4.95

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Ferroalloy Prices

Continued

Ferro-Tantalum-Columbium, 20% Ta, 40% Cb, 0.30 C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta $3.75

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo $1.32

Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton $65.00
10 tons to less carload..... $75.00

Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti..... $1.35

Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots..... 1.55

Ferrotitanium, 15 to 18%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton..... $177.00

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered $5.00

Ferrovanadium, 35-55% contract basis, delivered, per pound, contained V.
Openhearth ..... $3.00-$3.10
Crucible 3.10- 3.20
High speed steel (Primos) 3.20- 3.25

Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa. $1.14
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.13

Simanal, 20% Si, 20%, Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Carload, bulk lump..... 14.50¢
Ton lots, bulk lump..... 15.75¢
Less ton lots, lump..... 16.25¢

Vanadium Pentoxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.28

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
Ton lots ..... 21.00¢

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.
Carload, bulk ..... 7.00¢

Boron Agents

Borosil, contract prices per lb of alloy, del. f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B.... $5.25

Bortam, f.o.b. Niagara Falls
Ton lots, per pound..... 45¢
Less ton lots, per pound.... 50¢

Corbortam, Ti, 15-21%, B, 1-2%, Si, 2-4%, Al, 1-2%, C, 4.5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.
Ton lots, per pound..... 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots.... $1.20
F.o.b. Wash., Pa.; 100 lb up
10 to 14% B..... .85
14 to 19% B..... 1.20
19% min. B..... 1.50

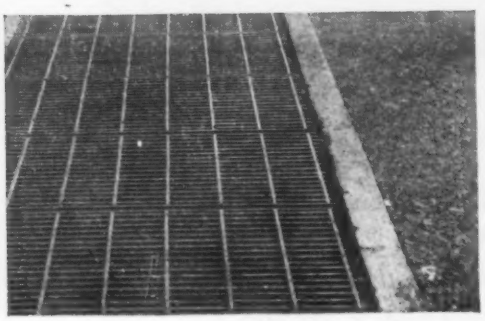
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.
No. 1 ..... $1.00
No. 6 ..... 68¢
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd
Ton lots $1.46
Less ton lots..... 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.
Less ton lots..... $1.80

Silcaz, contract basis, delivered.
Ton lots ..... 45.00¢

Hendrick Heavy-duty Grating . . .



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#9 William White Bulldozer, Motor Driven with 50 H.P. Motor. 440 v 3 ph. 60 cycle. Face of Crosshead 20" x 90", Movement of Crosshead 24".

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¾" McCabe Pneumatic Flanging Machine, Pneumatic Holddowns, Circle Flanging Attachment and numerous dies.
No. 3 Blue Valley Flanging Machine. Will flange flat heads from 48" to 10' or 12' dia. Silent chain drive with A.C. Motor. Equipped with air cylinder and hydraulic pump.

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2" AJAX Upsetting and Forging Machine. Suspended Header Slide. 20 H.P. Slip Ring A.C. Motor & Control.

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15 ton Heroult Model V-12 Electric Melting Furnace, Top Charge hydraulically operated. Complete with Transformer Equipment.

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10,000 lb. Chambersburg Steam Drop Hammer.

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48" x 48" x 20' Cincinnati, Four Head
48" x 48" x 12' Niles-Bement-Pond, Four Head
60" x 60" x 12' Niles-Bement Pond, Four Head
72" x 72" x 12' Niles-Bement-Pond, Four Head

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1000 ton Bliss #27 Knuckle Joint Embossing & Coining Press, 2½" Stroke, 18" Shut Height

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12½" x 16" Philadelphia Two High Cold Rolling Mill, Complete with Pinion Stand, 75 H.P. Motor 440/3/60. Starter and Controls, Incl. Coiler.
18" x 24" Waterbury Farrel Two Stand Two High Rolling Mill, Complete with Elec. Equip.

STRAIGHTENER

¾" Shuster Straightening & Cut-Off Machine 30' Cut-Off, Complete with 15 H.P. A.C. Motor.

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300,000 lb. SOUTHWARK-EMERY Universal Hydraulic Testing Machine

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#1049 Torrington Trimming Line, With Feed Rolls and Scrap Cutter. Capacity for steel or aluminum alloys ⅛" max. Trimmed width 22" min. 66" max. Scrap Length ¾" min. 2¼" max.

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The Clearing House

NEWS OF USED, REBUILT AND SURPLUS MACHINERY

Before Convention—The long-awaited amendment to CPR 80 should be issued shortly before Machinery Dealers National Assn. holds its convention in New York on May 8 to 10. Washington sources believe that the amendment will be published in the latter part of April.

MDNA's industry affairs committee was to meet on Wednesday, Apr. 9, to review the OPS situation and work on a plan for surplus machinery resulting from the end of the crisis.

It is expected that OPS will hold a meeting with its industry advisory committee on Apr. 16. Subject will be the CPR amendment. OPS will be in a position to publish a machine tool price book after the CPR amendment is issued. Much quicker action is expected on this matter.

Still Skids—Demand for used machinery in the Cleveland area has fallen off still further in the last month. Some sources report sales volume during March fell off as much as 30 pct from previous months. While this may not be characteristic of the entire industry, it does indicate that things are slowing down.

Most dealers attribute the slow-up in activity to the stretching out of tank and jet aircraft programs over a longer period. Others feel it is due partly to a more cautious attitude of industry in general concerning future business conditions. Some dealers report cancellations of orders due to cutbacks in the defense program.

Less Pressure—Inquiries have fallen off in some cases from 10 to 15 pct. The pressure from buyers is not as great on dealers as formerly. Some say that whereas they used to have ten different buyers looking for one piece of equipment, now there are only four. This seems to be true for machine tools of all ages.

Late type equipment is still easy to sell and the demand remains at high levels. However, there aren't as many buyers interested today. Prices for the moment don't seem to be undergoing downward revisions to any large extent.

Near Ceilings—Holders of surplus equipment still want close to ceiling for their machine tools before they'll let go of them. Late type equipment of all kinds is still hard to pick up. Sales of older types have fallen off.

Rebuilders in general are still enjoying healthy backlogs, particularly those working on equipment released from government reserve pools. Parts procurement remains one of the rebuilders' big bottlenecks, although it is somewhat improved.

Talks on Inventories — The newly formed Cleveland Chapter of the Machinery Dealers National Assn. held its regular monthly meeting Mar. 31. Guest speaker at the well-attended session was Jack Woll, chief of the used and available tool section of NPA's metalworking equipment division. He spoke on the new M-101 order covering reporting of inventories to NPA.

Mr. Woll stated that so far about 15,000 forms had been sent in and all reporting is expected to be completed in 2 to 3 weeks. He said a substantial number of machine tools had already been lined up with defense contractors. From the information available at this time he said that there seems to be a large amount of late type equipment available throughout the country.

Expansion—Albert Curry & Co., Inc., Pittsburgh, dealers in steel plant equipment, announced it is expanding its operations to include dismantling, match-marking, and re-erecting of steel mill equipment.